DOCUMENT RESUME

ED 122 020 CE 006 862

AUTHOR	Branson, Robert K.; And Others
TITLE	Interservice Procedures for Instructional Systems Development. Phase III: Develop.
INSTITUTION	Florida State Univ., Tallahassee. Center for Educational Technology.
SPONS AGENCY	Naval Education and Training Command, Pensacola, Fla.
PUB DATE	1 Aug 75
CONTRACT	FSU-N61339-73-C-0150
NOTE	380p.; The glossary and some charts will not reproduce well due to small print; For related documents, see CE 006 860-864
EDRS PRICE	MF-$0.83 HC-$20.75 Plus Postage
DESCRIPTORS	Educational Development; Educational Objectives; Educational Programs; Evaluation Methods; Instructional Media; *Instructional Systems; Job Training; Learning; Learning Activities; *Military Training; *Program Development; *Systems Development; Teaching Procedures; *Training Objectives
IDENTIFIERS	*Instructional Systems Development; ISD

ABSTRACT

The document is the third of a five-part series focusing in minute detail on the processes involved in the formulation of an instructional systems development (ISD) program for military interservice training that will adequately train individuals to do a particular job. The Develop phase consists of inputs, procedures, and outputs presented for five steps. The first step, Specify Learning Events/Activities, focuses on the classification of learning objectives by learning category in order to identify learning guidelines necessary for optimum learning to take place. The second step, Specify Instructional Management Plan and Delivery System, focuses on media selection to determine the manner in which instruction is to be packaged and presented to the student. Instructional management plans are developed to allocate and manage all resources for conducting instruction. The third step, Review/Select Existing Materials, focuses on the evaluation of materials for their appropriateness to the learning objectives, learner characteristics, and selected learning guidelines and management plan. The fourth step, Develop Instruction, assists the instructional designer in using available resources to produce instructional materials. The final development phase is Validate Materials, to ensure that instructional works and students achieve the learning objectives. A list of references, glossary, and index is included. (Author/BC)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED 122 020

Contract Number N61339-73-C-0150

INTERSERVICE PROCEDURES FOR INSTRUCTIONAL SYSTEMS DEVELOPMENT

PHASE III: DEVELOP

Gail T. Rayner
Robert K. Branson, Principal Investigator
John P. Furman
J. Lamarr Cox

Center for Educational Technology
Florida State University
Tallahassee, Florida 32306

1 August 1975

Prepared for:

The Interservice Committee for Instructional Systems Development
Worth Scanland, Chairman
Naval Education and Training Command
Pensacola, Florida 32508

The President
U.S. Army Combat Arms Training Board
Fort Benning, Georgia 31905

CE 006 862

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

PHASE III: DEVELOP

TABLE OF CONTENTS

BLOCK III.1: SPECIFY LEARNING EVENTS/ACTIVITIES 1
- Introduction 2
- Procedures 3
- Outputs 26

BLOCK III.2: SPECIFY INSTRUCTIONAL MANAGEMENT PLAN AND DELIVERY SYSTEM 105
- Introduction 106
- Procedures 107
- Outputs 142

BLOCK III.3: REVIEW/SELECT EXISTING MATERIALS 198
- Introduction 199
- Procedures 201
- Outputs 216

BLOCK III.4: DEVELOP INSTRUCTION 221
- Introduction 222
- Procedures 224
- Outputs 267

BLOCK III.5: VALIDATE MATERIALS 280
- Introduction 281
- Procedures 285
- Outputs 336

REFERENCES 347

GLOSSARY 360

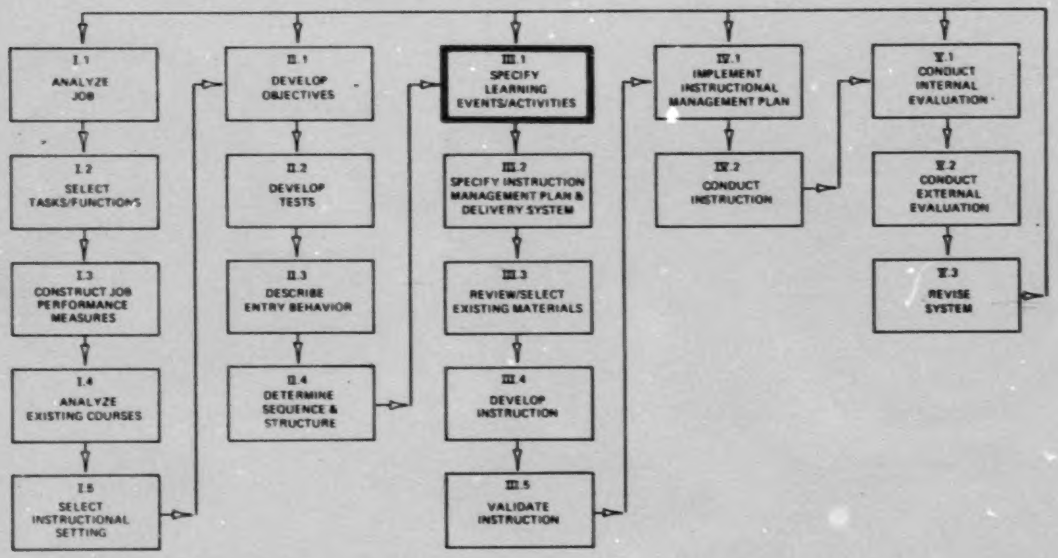
INDEX 385

ACKNOWLEDGEMENTS

Substantial contributions to this volume of the Interservice Procedures for Instructional Systems Development were made by: Nancy Gulliford, Dr. Richard Braby and the members of the Training Analysis and Evaluation Group, Dr. Wallace Hannum, Larry Wagner, Douglas Farrow, and Jim Carey.

Special acknowledgements for their work on this volume go to: Maj. Robert Bowersox, E. M. (Buddy) Evans, C. C. Jeter, Dr. Barbara Johnson, Maj. Edgar Maddox, and Maj. David Stephanson.

BLOCK III.1: SPECIFY LEARNING EVENTS/ACTIVITIES*


I.1 ANALYZE JOB
I.2 SELECT TASKS/FUNCTIONS
I.3 CONSTRUCT JOB PERFORMANCE MEASURES
I.4 ANALYZE EXISTING COURSES
I.5 SELECT INSTRUCTIONAL SETTING
II.1 DEVELOP OBJECTIVES
II.2 DEVELOP TESTS
II.3 DESCRIBE ENTRY BEHAVIOR
II.4 DETERMINE SEQUENCE & STRUCTURE
III.1 SPECIFY LEARNING EVENTS/ACTIVITIES
III.2 SPECIFY INSTRUCTION MANAGEMENT PLAN & DELIVERY SYSTEM
III.3 REVIEW/SELECT EXISTING MATERIALS
III.4 DEVELOP INSTRUCTION
III.5 VALIDATE INSTRUCTION
IV.1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV.2 CONDUCT INSTRUCTION
V.1 CONDUCT INTERNAL EVALUATION
V.2 CONDUCT EXTERNAL EVALUATION
V.3 REVISE SYSTEM

OVERVIEW

Particular learning events and activities must occur in the learning environment in order for instruction to be effective and efficient. Some general learning guidelines are applicable for a variety of learning objectives. Other guidelines are unique to each category of learning. The objectives of this block are to classify learning objectives according to the appropriate sub-category within their learning category, to identify, for each sub-category, those learning guidelines necessary for optimum learning to take place, and to specify activities that must take place in the learning environment to provide training most directly related to task performance.

---

*Portions of this material have been adapted from: Aagard, J. A, and Braby, R. Learning guidelines and algorithms for twelve types of training objectives (TAEG Report No. 23). Orlando, Fl.: Training Analysis and Evaluation Group, NTEC, (manuscript from to be published in mid-1975).

SPECIFY LEARNING EVENTS/ACTIVITIES

1.0 INTRODUCTION

The objectives of this block are to determine applicable learning guidelines and to specify learning activities that must take place in the learning environment to help make sure the instruction is as effective and efficient as possible, and is as directly related to task performance as possible.

All learning objectives do not require the same specific learning guidelines for optimum learning to take place. Information is not best learned the same way as a physical skill. This block provides guidance for separating learning objectives into sub-categories that may require different instructional treatment. Specific instructional guidelines are matched with the different sub-categories of objectives so the instruction can be as effective as possible.

The term "learning guideline" may not be clear at this point. Some learning guidelines that are essential to teaching a specific learning objective are shown in the following example.

EXAMPLE

> Suppose the learning objective is "classify a sonar target as 'submarine' or 'non-submarine'." In order to teach this, the activity would require calling attention to the important features that distinguish one pattern from another pattern. Then, it would require providing for students to practice making recognitions. In this case, "call attention to the important features that distinguish one pattern from another pattern" and "provide for students to

practice making recognitions," are just two of the many learning guidelines listed in this block for various sub-categories of learning objectives.

Another question you might want answered is, "what should be done with these learning guidelines?" These guidelines will be helpful in determining learning activities, and will be useful in Blocks III.2, III.3, and III.4 when selecting a management plan and delivery system, selecting existing materials, and developing instruction. The objectives of this block are:

1. to identify appropriate learning guidelines,
2. to provide guidance for their use in selecting or developing appropriate learning materials and specifying learning activities, and
3. to provide guidance for using learning activities in selection of appropriate media and management plans, and in developing appropriate learning materials.

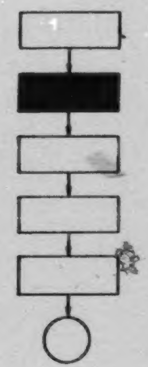
The steps in specifying learning events/activities are shown in Figure III.1, the fold-out page at the end of this block.

2.0 PROCEDURES

2.1 Identify General Learning Guidelines

There are four general guidelines that are appropriate for most learning objectives. These are:

1. Inform the learner of the objectives.



2. Provide for active practice.
3. Provide guidance and prompts for the learner.
4. Provide feedback to the learner.

These learning guidelines will assist students in learning a wide variety of new knowledge, skills, and attitudes. In determining exactly how to implement these general guidelines, consider their application in each of the groups of objectives resulting from the structuring of the objectives in Block II.4. Guidance for effective use of these general guidelines is discussed in the following sections. The guidelines are designed to provide for maximum performance training and to eliminate non-essential training.

2.1.1 Inform the Learner of the Objectives

The first general guideline is for the learner to be informed of the objectives. Students meet most objectives better when they have a clear understanding of what they are expected to learn. The best way to create this understanding is to inform them of the terminal learning objectives.

2.1.2 Provide for Active Response

The second general learning guideline is active responses on the part of the student. Students learn better when they actively practice the new learning. Practice on performance can assist in learning faster, improving during learning, and retaining what is learned.

Table III.1 contrasts the instructional conditions of active practice and passive conditions.

TABLE III.1

Contrasting Instructional Conditions: Active vs. Passive

ACTIVE PRACTICE CONDITIONS	PASSIVE CONDITIONS
During learning, the student has opportunity to produce, practice, or try his hand at the task to be learned. Student practice may: *Be embedded throughout instructional materials *Occur at wide intervals *Occur at the end, but before tests or on-the-job performance *Be observable or unobservable	The student has no opportunity to perform the task to be learned until after instruction has been completed. The student merely: *Listens to instructional materials about the actions to be learned *Reads about the actions to be learned *Watches a demonstration of the materials to be learned
Examples: *Solving problems *Applying principles to examples *Analyzing data *Correcting a malfunction	Examples: *Watching instructor solve problems on the board *Reading about application of principles to examples *Watching a demonstration of how to repair a malfunction

2.1.3 Provide for Guidance and Prompts

The third general learning guideline is for the students to receive appropriate guidance and promots. Cues or prompts before the performance can help students perform correctly without wasting time through trial and error learning. Guidance during early performance can assist the student in relating new learning to past learning and in focusing attention on specific cues of things to watch for during the performance.

Cues can be used in two ways, before or during practice. Table III.2 presents cues that precede practice and cues that accompany practice.

2.1.4 Provide for Feedback

The fourth general learning guideline is for the students to receive appropriate feedback. In order for practice to be as effective as possible, the student needs to have feedback about his performance. This feedback should let the student know what he is doing wrong, what he is doing right, and how he can improve his performance.

Table III.3 compares natural and artificial feedback. Tables III.4 and III.5 detail types of artificial feedback.

TABLE III.2

Cues That Precede Practice and Cues That Accompany Practice

PRECEDE PRACTICE	ACCOMPANY PRACTICE
Cues which tell or show the student how to perform.	Cues which provide hints which assist the student in performing.
* Before the learner is required to exhibit the criterion behavior, he is shown a demonstration of what he is expected to do. He then merely copies the performance he just witnessed. (For example, a Marine demonstrates how to disassemble a weapon. The student then disassembles the weapon the same way.)	* During practice, the student receives hints or assistance which guide his performance. The cues have properties the student can respond to, but are not sufficient to produce the response. * Cues tell the form of the expected response. (For example, "Your answer should be a fraction.")
* Before the learner is required to exhibit criterion behavior, he is given explicit verbal (oral or written) directions to guide his performance. (For example, "Insert part A into part B. Turn both parts until the widgets are aligned.")	* Cues depend on meaningful association or past knowledge. (For example, "one brown penny" is a cue for brown = 1.) * Cues draw attention to key properties (arrows, charts, diagrams).
Examples:	Examples:
Visual or Auditory Cues--	
* Demonstrate the movement and gesture of saluting. Following the demonstration, the student performs the movement the same way you did.	* Use visual or verbal cues to tell or show the student what his response should look like or sound like when he completes an action. Show the student an example or model. For example, "It should look like this diagram;" "It should contain two syllables;" "It should have three distinct parts."
* Demonstrate the steps involved in finding a square root on a calculator. After watching the steps, the learner practices taking the exact same steps.	

Table III.2 (Continued)

Cues That Precede Practice and Cues That Accompany Practice

PRECEDE PRACTICE	ACCOMPANY PRACTICE
* Demonstrate the correct pronunciation of an Arabic word. Following the demonstration, the student says it the same way you did.	* Use verbal cues that bring to mind past associations which trigger the response. Or, recall previous content or discussions which make the response obvious. * Use visual cues that draw attention to the most important parts or the stimulus. Cue the response the student is to make by using arrows, diagrams, charts, tabular format, headings, color-coding, layout, capitalization, underlining, or other graphic devices.
Verbal Cues to Guide the Action--	
* Tell a student to calculate a mean by adding all the scores and dividing the sum by the number of scores. The student follows the directions exactly and correctly calculates a mean.	
* Tell the student of French to say "a" when he sees "e" in a written French word. The student says "a" upon seeing the written letter "e", and correctly pronounces the word.	

TABLE III.3

Forms Feedback May Take

NATURAL FEEDBACK	ARTIFICIAL FEEDBACK
Arises naturally from the task environment. The results of an action taken is one type of natural feedback. Another would be the actual product or object produced. This form of feedback is present both during learning and later on the job. Pushing a button and getting a correct reading on an instrument is one example.	Does not arise out of the task itself. It is provided by additional means, such as instructor critique or mechanical indicator. This form of feedback is present only during learning and must be carefully planned. (See Tables III.4 and III.5.)

TABLE III.4

Types of Artificial Feedback

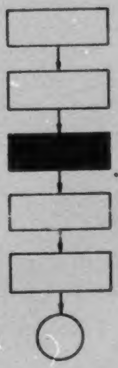
APPROPRIATE ARTIFICIAL FEEDBACK	LESS APPROPRIATE ARTIFICIAL FEEDBACK
Complete: Provide feedback in the context of the learning material.	Incomplete: Merely indicate right or wrong.
Immediate: Give correction immediately after each practice trial.	Delayed: Give all the answers at the end of an exercise.
Similarity: Like the product or action produced by the student. For example, provide a standard against which the student may compare his output.	Dissimilarity: Different from the product or action produced by the student. For example, provide a checklist as to what the product should be like, rather than the product itself.
Specific: Identify errors in the performance.	General: Give a grade.

TABLE III.5

Examples of Contrasting Artificial Feedback Conditions

EFFECTIVE	LESS EFFECTIVE
Spanish student practices saying a word and immediately hears the correct word spoken on a tape. Practice and feedback are same mode.	Student practices saying a word and the correct phonetic spelling is flashed on a screen immediately afterward. Practice and feedback are in different modes.
A man learning to fill out forms compares his completed forms with standards. The standards he uses are filled out on the same exercise he is practicing.	The standards used for comparison are filled out with another exercise. Here the content of the feedback is different.
A student is learning to set up laboratory equipment. After setting up the equipment, he is shown a mockup of the correct setup to compare his setup with.	A student is given a verbal description of a correct laboratory setup to determine if his is correct. His setup is visual, but the feedback is verbal.
A student is learning to solve algebraic equations. His feedback includes all steps in the equation, allowing him to check each step in his answers.	Feedback is indicated only by statement of right or wrong. If his answer is wrong, he has no way of determining where he went wrong.

2.2 Classify Each Learning Objective According to Category and Sub-Category of Learning



The use of the general instructional guidelines will help to design effective instruction. They are particularly useful when looking at large groups of learning objectives. They are good "rules of thumb" for beginning to specify learning guidelines that facilitate learning. They are not sufficient in themselves to produce effective and efficient instruction. You also need to include the specific, unique learning guidelines for different categories and sub-categories of objectives. The first step in identifying those unique guidelines is to classify each learning objective according to its learning category. Once the appropriate learning category has been specified (this takes place in II.1 when developing objectives) the appropriate sub-category of learning within each category needs to be determined. This classification step also will be helpful in Block III.2 when you begin the task of specifying the instructional management plan and delivery system.

The categories and sub-categories with which you will be concerned are:

LEARNING CATEGORY	SUB-CATEGORY
I. Mental Skill:	1. Rule Learning and Using
	2. Classifying-Recognizing Patterns
	3. Identifying Symbols
	4. Detecting
	5. Making Decisions
II. Information:	6. Recalling Bodies of Knowledge
III. Physical Skills:	7. Performing Gross Motor Skills
	8. Steering and Guiding-Continuous Movement
	9. Positioning Movement and Recalling Procedures
	10. Voice Communicating
IV. Attitude:	11. Attitude Learning

Table III.6 lists behavioral attributes, learning objective action verbs, and examples for each sub-category of learning. To classify each of your learning objectives into one of the learning sub-categories, check

TABLE III.6

Description of Training Task Categories

LEARNING CATEGORY	SUB-CATEGORY	ACTION VERBS	BEHAVIORAL ATTRIBUTES	EXAMPLES
I. Mental Skill	1. Rule Learning & Using	Apply Conclude Deduce Predict Propose Select Specify Solve Determine Repair	1. Choosing a course of action based on applying known rules. 2. Frequently involves "If...then" situations. 3. The rules are not questioned, the decision focuses on whether the correct rule is being applied.	1. Apply the "rules of the road." 2. Solve mathematical equations (both choosing correct equations and the mechanics of solving the equation). 3. Carrying out military protocol. 4. Selection of proper fire extinguisher for different types of fires. 5. Using correct grammar in novel situations covered by rules.
I. Mental Skill	2. Classifying-Recognizing Patterns	Classify Differentiate Identify Recognize	1. Pattern recognition approach to identification--not problem solving. 2. Classification by non-verbal characteristics. 3. Status determination--ready to start. 4. Object to be classified can be viewed from many perspectives or in many forms.	1. Classify a sonar target as "sub" or "non-sub." 2. Visual classification of flying aircraft as "friend" or "enemy" or as an "F-4." 3. Determining that an identified noise is a wheel bearing failure not a water pump failure by rating the quality of the noise--not by the problem solving approach.
I. Mental Skill	3. Identifying Symbols	Identify Read Transcribe	1. Involves the recognition of symbols such as in codes, diagrams, schematics, etc. 2. Symbols to be identified typically are of low meaningfulness to untrained persons. 3. Identification, not interpretation, is emphasized.	1. Reading electronic symbols on a schematic drawing. 2. Identifying map symbols. 3. Reading and transcribing symbols on a tactical status board. 4. Identifying symbols on a weather map.

TABLE III.6 (Continued)

Description of Training Task Categories

LEARNING CATEGORY	SUB-CATEGORY	ACTION VERBS	BEHAVIORAL ATTRIBUTES	EXAMPLES
I. Mental Skill	4. Detecting	Detect Distinguish Monitor	1. Vigilance--detect a few cues embedded in a large block of time. 2. Low threshold cues; signal to noise ratio may be very low; early awareness of small cues. 3. Scan for a wide range of cues for a given "target" and for different types of "targets."	1. Early sonar detection of a submarine target. 2. Visually detecting the periscope of a snorkeling submarine during daytime. 3. Detect, through a slight change in sound, a bearing starting to burn out in a power generator.
I. Mental Skill	5. Making Decisions	Choose Diagnose Develop Evaluate Forecast Formulate Organize Select Repair	1. Choosing a course of action when alternatives are unspecified or unknown. 2. A successful course of action is not readily apparent. 3. The penalties for unsuccessful courses of action are not readily apparent. 4. The relative value of possible decisions must be considered--including possible trade-offs.	1. Choosing torpedo settings during a torpedo attack. 2. Threat evaluation and weapon assignment. 3. Choice of tactics in combat--wide range of options. 4. Choosing a diagnostic strategy in dealing with a malfunction in a complex piece of equipment. 5. Choosing to abort or commit oneself to land upon reaching the critical point in the glidepath.
II. Information	6. Recalling Bodies of Knowledge	List Define State Recite Select	1. Concerns verbal or symbolic learning. 2. Concerns acquisition and long-term maintenance of knowledge so that it can be recalled.	1. Recalling equipment nomenclature or functions. 2. Recalling system functions, such as the complex relations between system input and output. 3. Recalling physical laws, such as Ohm's Law. 4. Recalling specific radio frequencies and other discrete facts.

TABLE III.6 (Continued)

Description of Training Task Categories

LEARNING CATEGORY	SUB-CATEGORY	ACTION VERBS	BEHAVIORAL ATTRIBUTES	EXAMPLES
III. Physical Skill	7. Perform Gross Motor Skills	Cut Draft Draw March Mix Run Sew Sharpen Splice Swim Weld Write	1. Perceptual motor behavior; emphasis on motor. Premium on manual dexterity, occasionally strength and endurance. 2. Repetitive mechanical skills. 3. Standardized behavior, little room for variation or innovation. 4. Automatic behavior--low level of attention is required in skilled operator. Kinesthetic cues dominate control of behavior. 5. Fatigue or boredom may become a factor when skill is performed over an extended period of time or at a rapid rate. 6. Fine tolerances. 7. Often a component of a larger task.	1. Use of hand tools such as hammer, saw, wrench, or power tools such as lathes or grinders. 2. Running a drill press in an assembly line. 3. Loading ammunition into artillery pieces of 5" guns. 4. Drafting--use of drafting instruments. 5. Painting--house painting or preserving ship hull, etc. 6. Marching--close order drill.
III. Physical Skill	8. Steering and Guiding Continuous Movement	Control Guide Maneuver Regulate Steer Track	1. Tracking, dynamic control--a perceptual motor skill involving continuous pursuit of a target or keeping dials at a certain reading such as maintaining constant turn rates, etc. 2. Compensatory movements based on feedback from displays. 3. Skill in tracking requires smooth muscle coordination patterns--lack of overcontrol. 4. Involves estimating changes in positions, velocities, accelerations, etc. 5. Involves knowledge of display-control relationships.	1. Submarine bow and stern planes operators maintaining a constant course, or making changes in course or depth. 2. Tank driver following a road. 3. Sonar operator keeping the cursor on a sonar target. 4. Air-to-air gunnery--target tracking. 5. Aircraft piloting such as visually following a ground path. 6. Helmsman holding a course with gyro or magnetic compass.

TABLE III.6 (Continued)

Description of Training Task Categories

LEARNING CATEGORY	SUB-CATEGORY	ACTION VERBS	BEHAVIORAL ATTRIBUTES	EXAMPLES
III. Physical Skill	9. Positioning Movement & Recalling Procedures	Activate Adjust Align Assemble Calibrate Disassemble Inspect Operate Service	1. Concerns the chaining or sequencing of events. 2. Includes both the cognitive and motor aspects of equipment set-up and operating procedures. 3. Procedural check lists are frequently used as job aids.	1. Recalling equipment assembly and disassembling procedures. 2. Recalling the operation and check out procedures for a piece of equipment (cockpit check lists). 3. Following equipment turn-on procedures--emphasis on motor behavior.
III. Physical Skill	10. Voice Communicating	Advise Answer Communicate Converse Direct Express Instruct Interview Listen Order Report Sing Speak	1. Speaking and listening in specialized languages. 2. Often involves the use of a specific message model. Standard vocabulary and format. 3. Also concerns clarity of voice, enunciation and speed. 4. Timing of verbalization if usually critical--when to pass information. 5. Typically characterized by redundancy in terms of information content. 6. Involves extensive use of previously overlearned verbal skills, or overcoming overlearned interfering patterns. 7. Tasks may be difficult due to background noise.	1. Officer giving oral orders and receiving reports. 2. Sonar operator passing oral information over communications net. 3. Instructions by ground control operator to pilot in landing aircraft.

TABLE III.6 (Continued)

Descriptions of Training Task Categories

LEARNING CATEGORY	SUB-CATEGORY	ACTION VERBS	BEHAVIORAL ATTRIBUTES	EXAMPLES
IV. Attitude	11. Attitude Learning	Abide Accept Comply Choose Select	1. Concerns exhibiting a pattern of behavior consistent with an attitude or value. 2. Concerns willingness to perform according to a standard as opposed to skill to perform according to that standard. (NOTE: A person can have a high level of skill but choose not to perform in a skillful manner.) 3. Concerns integrating or organizing a value or attitude into a pattern of behavior.	1. Complying with known safety standards while performing a maintenance procedure on a high voltage supply in a radar set. 2. Conforming to the standard of keeping one's bunk area neat and clean when the opportunity exists to do otherwise. 3. Abiding by security regulations when handling classified information. 4. Accepting the need to take risks when necessary to protect the lives of teammates. 5. Complying with a request to repair a malfunctioning radio circuit with greater than normal speed when a quick response is required.

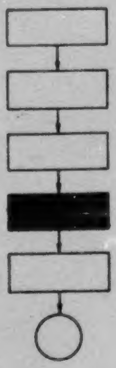
the learning objective against the information given for each category, and decide in which category it fits best.

If you have difficulty fitting a learning objective into a single sub-category because it seems to fit equally well in several sub-categories, the learning objective may not be specific or clear, the action required may be two or more objectives or it may have other faults. Decide what in the objective will require the most instruction. Place the objective in that category.

EXAMPLE

> The learning objective might be "Paint barracks when painting is needed." Applying the paint is a repetitive mechanical skill, and the objective fits sub-category 7, performing gross motor skills. However, knowing when painting is needed requires choosing a course of action based on applying known rules, and the objective also fits sub-category 1, rule learning and using. Divide the original objective into two new ones: "Paint the barracks," and "Identify that barracks needs painting."

2.3 Identify Specific Learning Guidelines for Each Sub-Category of Learning

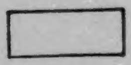


The next step is to identify the specific learning guidelines applicable to the learning sub-category for each learning objective. Since you classified each learning objective in the last section, the first requirement here is to locate the particular learning sub-category and note the list of learning guidelines given for each. Generally, you will select a subset of these guidelines rather than attempt to use all of them. These guidelines will be essential for carrying out the Review/Select Existing Material activity in Block III.3 and the Develop Instruction Activity in Block III.4.

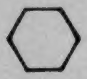
In addition to the list of learning guidelines, each learning sub-category has a flowchart diagramming suggested techniques and conditions for introducing the appropriate learning guidelines.

The written information is contained in a flowchart and presented with symbols of various shapes. It is the shape of the symbol which indicates the purpose of the information and how it can help in the procedures of the sub-category in question. The significance of these symbols will be discussed briefly.

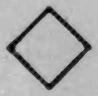
Rectangles contain specific instructions for activities which should be carried out by the instructor.



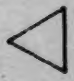
Hexagons contain further explanation or additional information to aid the instructor in carrying out the activity of the instruction symbol.



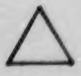
Diamond-shaped symbols indicate a decision point. It is at this point in the instructional process that an answer to the question contained in the diamond should enable the instructor to make a decision regarding future activities.



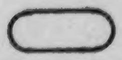
Horizontal triangles represent sub-routines and present an activity or suggestion designed to help answer the decision point question.



Vertical triangles represent an optional rest or stopping point between activities or decisions.



Finally, an oval shape represents points at which one may enter or exit from the activities described by the flowchart.



By beginning at the oval marked "start" and proceeding through the information and suggestions contained in the symbols described previously, an instructional developer can follow the procedural steps listed for the particular sub-category.

Use the learning objective action statement, conditions, standards, and the test item to help select which guidelines to apply to the specific learning objective or group of learning objectives. This will require some judgment. But remember, you are trying to limit instruction to that which is essential to mastery of the learning objective. You will use the instruction with students informally in Block III.4 and formally in Block III.5. If it does not work, come back to this block and add or change learning guidelines. Select guidelines that make sense for the objective.

EXAMPLE

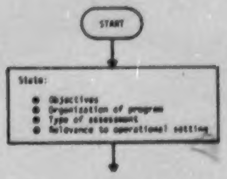
> If you have a CLASSIFYING objective like "identifying poisonous plants," when you get to guideline 16, "To test learning, require the trainee to provide new examples of the pattern," you know that this is inappropriate. Designing new poisonous plants would not help the learner identify existing ones.

There are two alternatives for selecting learning events. You may use the decision trees (flowcharts) or the learning guidelines. The end result should be very much the same, as the guidelines are derived from the algorithms. Examples using each alternative follow.

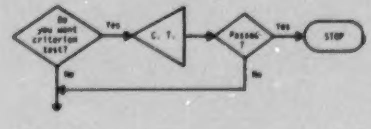
EXAMPLES

1. Using flowcharts--

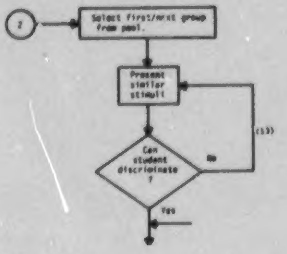
    1) Classify pictures of ships as US or USSR. Students will identify pictures of US or USSR ships. In an operational setting, students will identify ships and be prepared to take appropriate action.


START
State:
Objectives
Organization of program
Type of assessment
Relevance to operational setting

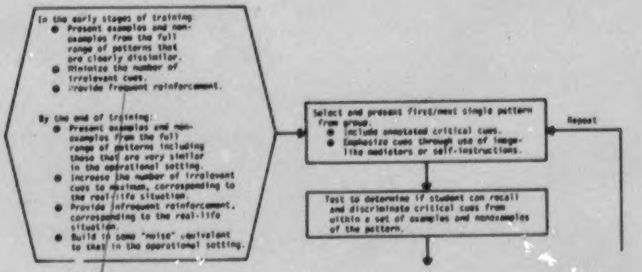
    2) Pretest.


Do you want criterion test?
Yes
C. T.
Passed ?
Yes
STOP
No
No

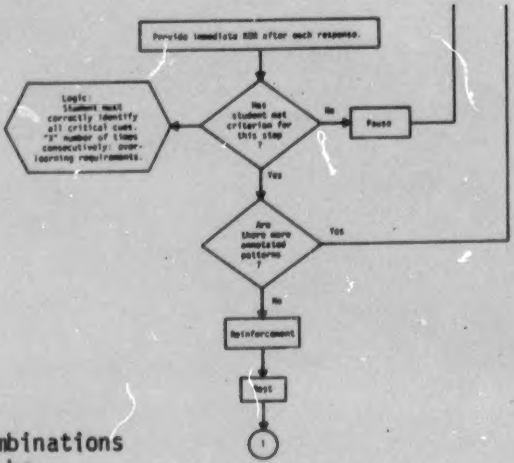
    3) Present ships that look alike.


2
Select first/next group from pool.
Present similar stimuli
Can student discriminate ?
No
(13)
Yes

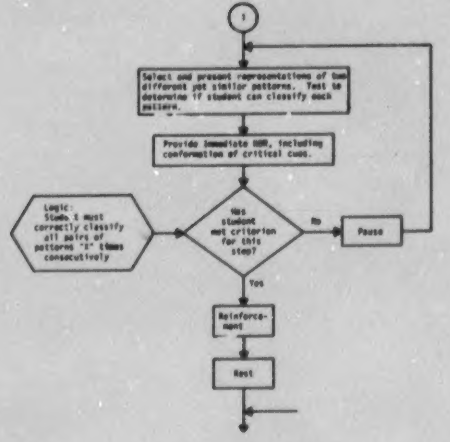
    4) Present each ship with the unique features emphasized.


In the early stages of training:
Present examples and non-examples from the full range of patterns that are clearly dissimilar.
Minimize the number of irrelevant cues.
Provide frequent reinforcement.
By the end of training:
Present examples and non-examples from the full range of patterns including those that are very similar in the operational setting.
Increase the number of irrelevant cues to maximum, corresponding to the real-life situation.
Provide infrequent reinforcement, corresponding to the real-life situation.
Build in some "noise" equivalent to that in the operational setting.
Select and present first/next single pattern from group.
Include annotated critical cues.
Emphasize cues through use of image-like mediators or self-instructions.
Repeat
Test to determine if student can recall and discriminate critical cues from within a set of examples and nonexamples of the pattern.

5) Tell the student when he is right, and the correct classification when he is wrong and why.

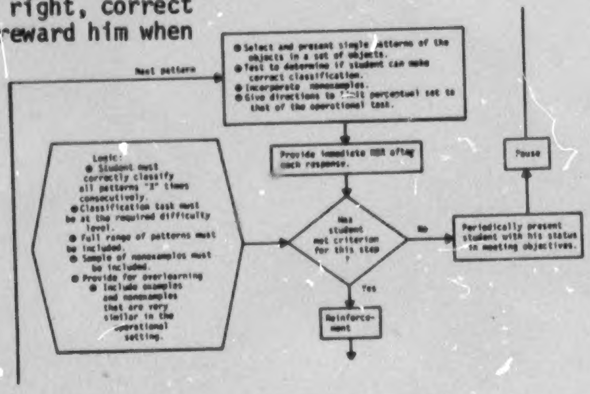

Provide immediate KOR after each response.
Logic:
Student must correctly identify all critical cues. "X" number of times consecutively: over-learning requirements.
Has student met criterion for this step ?
No
Pause
Yes
Are there more annotated patterns ?
Yes
No
Reinforcement
Rest
1

6) Present alike combinations of ships that might be confused.

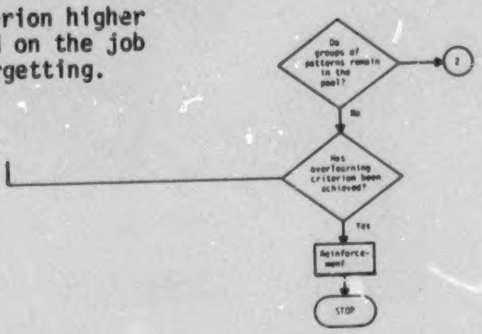

1
Select and present representations of two different yet similar patterns. Test to determine if student can classify each pattern.
Provide immediate KOR, including conformation of critical cues.
Logic:
Student must correctly classify all pairs of patterns "X" times consecutively
Has student met criterion for this step?
No
Pause
Yes
Reinforcement
Rest

7) Present ships in groups.

8) Keep telling the student when he gets it right, correct his errors and reward him when he is right.


Next pattern
● Select and present single patterns of the objects in a set of objects.
● Test to determine if student can make correct classification.
● Incorporate nonexamples.
● Give directions to limit perceptual set to that of the operational task.
Provide immediate KOR after each response.
Logic:
● Student must correctly classify all patterns "X" times consecutively.
● Classification task must be at the required difficulty level.
● Full range of patterns must be included.
● Sample of nonexamples must be included.
● Provide for overlearning
● Include examples and nonexamples that are very similar in the operational setting.
Has student met criterion for this step ?
No
Periodically present student with his status in meeting objectives.
Pause
Yes
Reinforcement

9) Set the criterion higher than is required on the job to allow for forgetting.


Do groups of patterns remain in the pool?
2
No
Has overlearning criterion been achieved?
Yes
Reinforcement
STOP

2. Using guidelines--Sub-category 2, CLASSIFYING

Learning
Guideline #

1) Learning objective action statement: Classify pictures of ships as US and USSR.

   Operational task: From ships or from the air classify other ships as friendly or enemy. Be prepared to take appropriate action.

2) Present each ship with unique features emphasized.

3) Present ships that look alike and show how they are different. (Last part about distinctive features not to be classified in the training task is irrelevant in this objective.)

4) Association devices-use diagrams of the ships or in this case drawings.

5) Present examples of US and non-examples of US. In this case, non-examples will be USSR. Present easily confused or similar ships together.

6) Start with easier ships and work up to the ones that are more difficult to discriminate.

7) Reward student early in training, decrease the reward as the training progresses until it matches the "reward" (if any) on the job.

8) Provide as much practice as is needed for trainees.

9) Provide immediate KOR.

10) Let the student check why he was right or wrong and correct errors.

11) Go from diagram or drawings to pictures of real ships.

12) Include any camouflage or distractions that might occur in the real world.

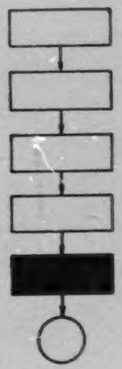
13 & 14) Allow all trainees plenty of time and practice.

15) Keep the job task in mind and keep students looking at critical cues.

16) This is not appropriate. The student cannot design either a US or USSR ship.

17) The criteria may be set at 100% for this learning objective. (There is some evidence that people have about an 80 aircraft or ship memory bank and that is maximum.) Do not try to exceed people's capacity. Provide review on time.

2.4 Specify Learning Activities



While learning guidelines are suggestions for learning stimuli for categories and subcategories of learning objectives, a learning activity is specific to a particular learning objective. How to specify learning activities is shown in the following example.

EXAMPLE

The terminal learning objective is: Identify US and USSR destroyers. Some of the learning objectives are:

LEARNING SUB-CATEGORY	OBJECTIVE
Classifying	1. Classify Claud Jones Class as US or USSR.
Classifying	2. Classify Forrest Sherman Class as US or USSR.
Classifying	3. Classify KOTLIN Class as US or USSR.
Classifying	4. Classify RIGA Class as US or USSR.
Classifying	5. Classify KOLA Class as US or USSR.

The learning guidelines for all five objectives are so similar that you may make decisions for the whole group at the same time. After selecting the learning guidelines appropriate for the objectives, the next step is to specify how to carry out that guideline in instruction. This specification is the learning activity. The activity specifies how to go about accomplishing the learning guidelines.

LEARNING GUIDELINE #	LEARNING GUIDELINE	CORRESPONDING ACTIVITY
1.	Clearly inform the trainee.	State the objective in writing.
3.	Display distinctive features of the pattern.	Call attention to the differences in each ship in pictures.
8.	Provide opportunities for practice.	Practice identifying by looking at pictures with correct identification available immediately.
11.	Provide full range of patterns.	Show varying views of the ships.

> You could have chosen more, but try these and if they are not effective, change them later. If you use too many, it will be hard to identify the unneeded activities.

The specified activities will be used to select the delivery system, and therefore, affect both the development and implementation costs. Keep the following general comparative costs in mind when specifying activities.

1. Color is more expensive than black and white.
2. Film is more expensive than television.
3. Motion is more expensive than stills.
4. Print is usually the least expensive.

For high-flow courses, the development costs are spread over high numbers of learners and therefore allow more choices. There are often economies of scale in production and implementation of instruction. That is, printing one color microfishe might cost $75 but 50 of them will also cost a total of $75, or $1.50 for each. If 1,000, are required, the cost per "fische" will drop significantly. Therefore, keep in mind how many users there will be.

The learning objective conditions will influence the learning activities. If the learner must identify the ships from the air when he is moving rapidly, the activities may be different than if the learner must identify the ship from another ship, or just in pictures.

The learning objective standards also will influence the specification of learning activities. If to pass, the learners have to identify ships within 2 seconds, activities must be chosen that will bring them to that level of performance.

When you have planned the activities, write them in the space provided on the worksheet. (See Figure III.2.)

3.0 OUTPUTS

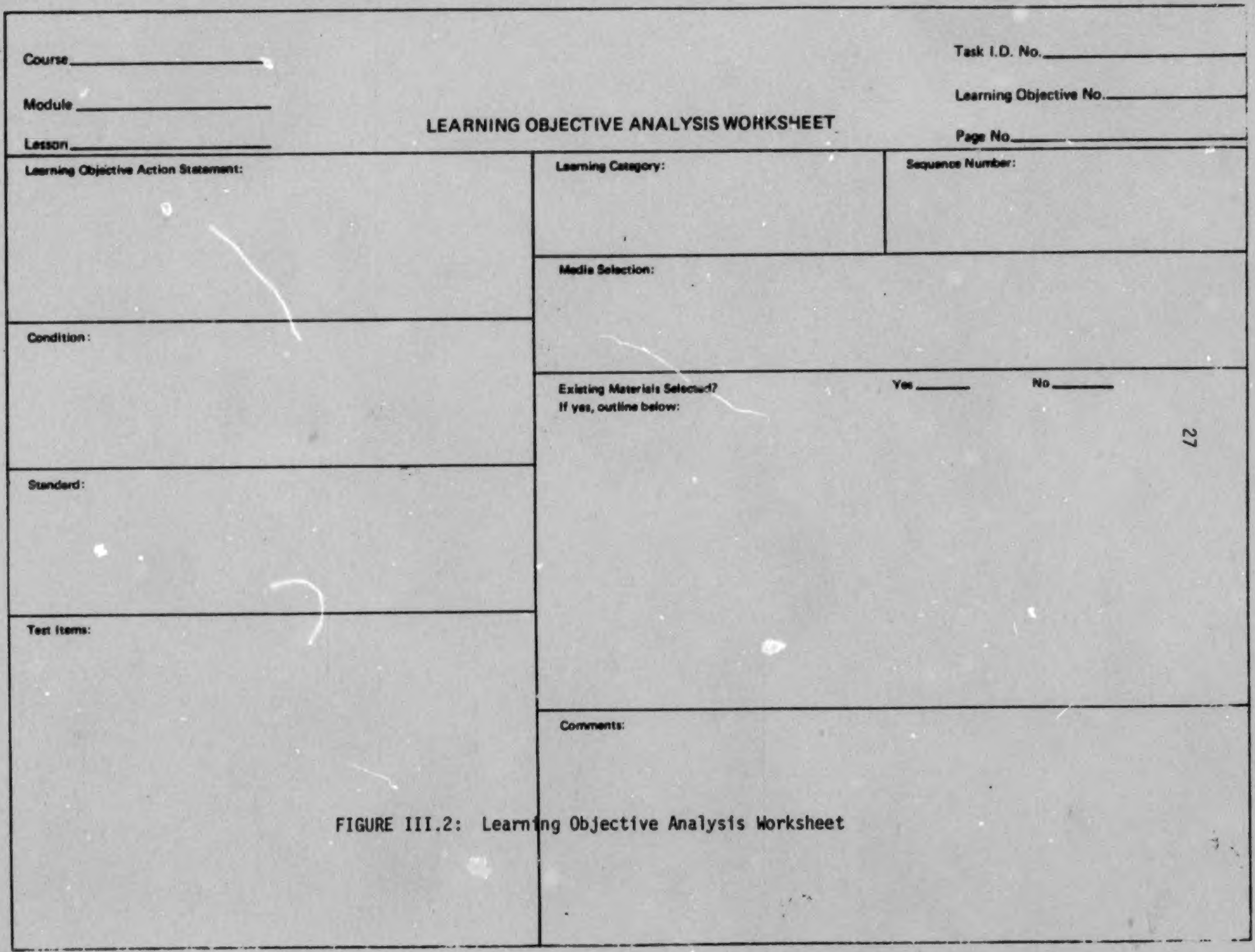
The outputs of this block should consist of:

3.1 Products

1. Documentation of the category and sub-category into which each learning objective was classified. (See example, page 28.)
2. Learning guidelines selected for each learning objective or group of learning objectives. (See example, page 28.)
3. Learning activities specified for each learning objective or group of learning objectives.

3.2 Other Documentation

1. A summary statement of areas where learning activities are more likely to require revision or additions after evaluation.
2. A summary statement of the rationale for any revisions to learning objectives resulting from the classification process, and a summary statement of how the requirements of Blocks II.2, II.3, and II.4 were satisfied for these revised items.



LEARNING OBJECTIVE ANALYSIS WORKSHEET

Course ____________

Module ____________

Lesson ____________

Task I.D. No. ____________

Learning Objective No. ____________

Page No. ____________

Learning Objective Action Statement:

Learning Category:

Sequence Number:

Media Selection:

Condition:

Existing Materials Selected? Yes ______ No ______
If yes, outline below:

Standard:

Test Items:

Comments:

FIGURE III.2: Learning Objective Analysis Worksheet

EXAMPLES

1. Sample Documentation of Categories and Sub-Categories for Tasks of OH-58 Helicopter Repairman-Action Components Only:

    1. Lubricate main drive shaft: Physical skill-Performing gross motor skills

    2. Disassemble tail rotor disc assembly: Physical skill-Positioning movement and recalling procedures

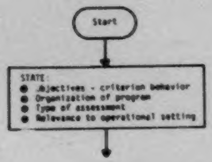
    3. Inspect main transmission mast assembly: Physical skill-Positioning movement and recalling procedures

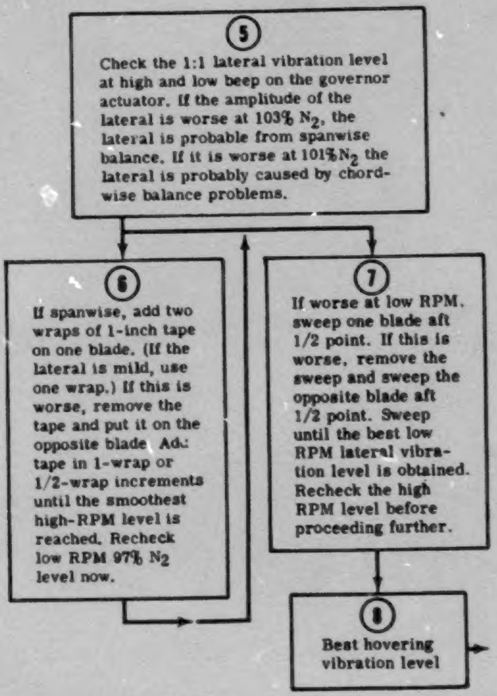
2. Sample Learning Guidelines and Learning Activities for the Learning Objective: Using a job aid (partially shown below) and general mechanics tool kit, determine main rotor vibrations and correct to less than 1:1.

Learning Objective--

Action: Determine and correct main rotor vibrations.
Condition: Using the job aid (partly shown below) and general mechanics tool kit.
Standard: Vertical vibrations must be less than 1:1 after correction.

Job Aid with Rules:


Start
STATE:
Objectives - criterion behavior
Organization of program
Type of assessment
Relevance to operational setting



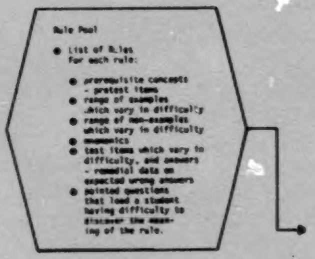
5. Check the 1:1 lateral vibration level at high and low beep on the governor actuator. If the amplitude of the lateral is worse at 103% N_2, the lateral is probable from spanwise balance. If it is worse at 101% N_2 the lateral is probably caused by chordwise balance problems.

6. If spanwise, add two wraps of 1-inch tape on one blade. (If the lateral is mild, use one wrap.) If this is worse, remove the tape and put it on the opposite blade. Add tape in 1-wrap or 1/2-wrap increments until the smoothest high-RPM level is reached. Recheck low RPM 97% N_2 level now.

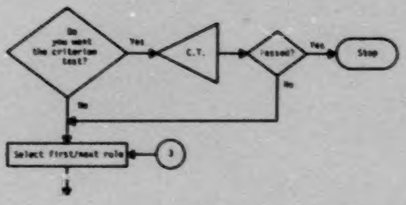
7. If worse at low RPM, sweep one blade aft 1/2 point. If this is worse, remove the sweep and sweep the opposite blade aft 1/2 point. Sweep until the best low RPM lateral vibration level is obtained. Recheck the high RPM level before proceeding further.

8. Best hovering vibration level

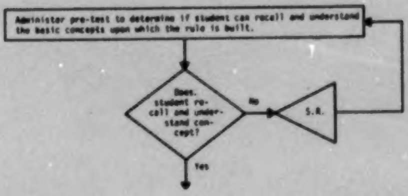
Hexagonal figures in the flowcharts contain details of what inputs are needed.


Rule Pool
● List of Rules
for each rule:
● prerequisite concepts
- pretest items
● range of examples
which vary in difficulty
● range of non-examples
which vary in difficulty
● mnemonics
● test items which vary in
difficulty, and answers
- remedial data on
expected wrong answers
● pointed questions
that lead a student
having difficulty to
discover the meaning of the rule.

Once the objective is stated, the next step is a decision to give a test to determine if the student can perform the objective (these test items have been developed in Block II.2). If the decision is to administer the test and the student passes it, he does not need the instruction for this learning objective. If the decision is not to administer the test or the student fails the test, the next step is to teach the rules, (this objective includes a series of rules). For this example, the first rule selected for instruction is the rule described in block 6 of the Job Aid about wrapping the blades.

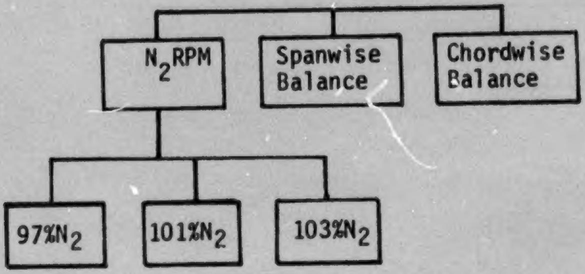

Do you want the criterion test?
Yes
C.T.
Passed?
Yes
Stop
No
No
Select first/next rule
3

The student is then pretested to determine if he can recall the concepts upon which the rule is built (these concepts can be found in the learning analyses). For example, such concepts as N, RPM, spanwise balance, chordwise balance, lateral vibrations, etc., need to be tested. The student's understanding of the concepts is a necessary prerequisite before further learning of the task can be started.


Administer pre-test to determine if student can recall and understand the basic concepts upon which the rule is built.
Does student recall and understand concept?
No
S.R.
Yes

If the student understands the concepts for the rule he is learning, the next step is to learn the rule. If he does not understand the concepts, he must be taught the concepts (sub-routine) and retested.

Learning Analysis Underlying Concepts

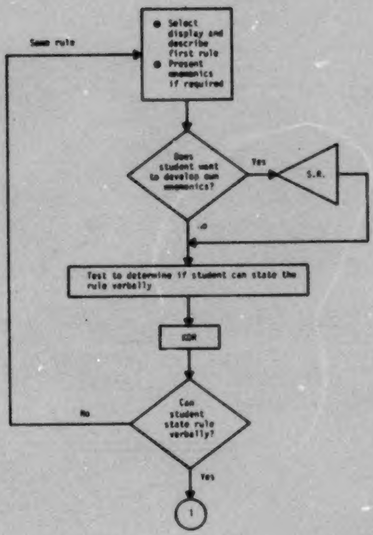

N_2RPM
Spanwise Balance
Chordwise Balance
97%N_2
101%N_2
103%N_2

After knowledge of the concepts is obtained, instruction for the rule begins. In this case, the student would learn to describe, by stating, the rules for wrapping the blades. (Job Aid steps 5 & 6) Also, mnemonics could be developed if appropriate.

The next step is to encourage the students to develop their own personal mnemonics.

The next step usually is to determine if the student can state the rule verbally. This does not have to be verbatim, but should state the essential meaning of the rule. Following this statement, the student is given knowledge of results (KOR). If the student cannot state the rule verbally, he recycles in the flowchart to the select and display box.

In this case the student has a Job Aid with the rule on it so there is no need to memorize the rule.


Same rule
Select display and describe first rule
Present mnemonics if required
Does student want to develop own mnemonics?
Yes
S.R.
No
Test to determine if student can state the rule verbally
KOR
Can student state rule verbally?
No
Yes
1

If the student can state the rule verbally the next step involves presenting examples of when the rule does and does not apply.

The rule is to add two wraps of 1 inch tape on one blade if the lateral vibration is from spanwise balance. The next rule applies if the lateral is mild--use only one wrap. The third rule is used if the wraps made the situation worse.

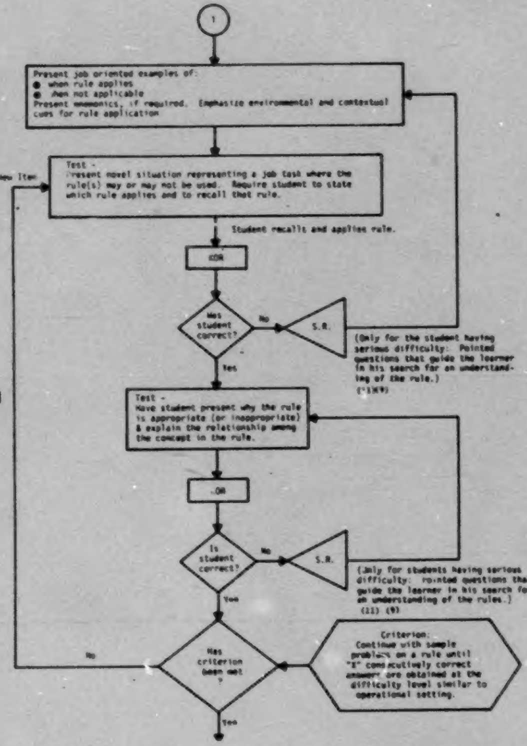
It is during this step that the rule is taught.

To test whether the student can apply the rule and knows when to apply the rule, the next step involves presenting the student with a new situation where he determines if the rule should be applied, and applies the rule when appropriate.

Following this step the student is given knowledge of results (KOR) based on his responses.

If the student was incorrect, he is recycled to that part of the flowchart in which he is presented with examples of when not to apply the rule.

If the student is correct, he is tested in the next step, by having him state why the rule is appropriate or inappropriate and the relationship between the concepts contained in the rule. KOR is then given based on the students response.


1
Present job oriented examples of:
● when rule applies
● when not applicable
Present mnemonics, if required. Emphasize environmental and contextual cues for rule application
New Item
Test -
Present novel situation representing a job task where the rule(s) may or may not be used. Require student to state which rule applies and to recall that rule.
Student recalls and applies rule.
KOR
Was student correct?
No
S.R.
(Only for the student having serious difficulty: Pointed questions that guide the learner in his search for an understanding of the rule.)
(11)(9)
Yes
Test -
Have student present why the rule is appropriate (or inappropriate) & explain the relationship among the concept in the rule.
KOR
Is student correct?
No
S.R.
(Only for students having serious difficulty: Pointed questions that guide the learner in his search for an understanding of the rules.)
(11) (9)
Yes
Has criterion been met ?
No
Criterion:
Continue with sample problems on a rule until "X" consecutively correct answers are obtained at the difficulty level similar to operational setting.
Yes

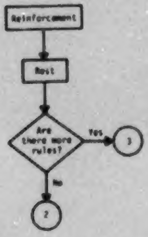
If the student is incorrect, pointed questions which guide the student to the appropriate responses are asked prior to the student being recycled to the testing situation.

If the student is correct, the next decision to make is to determine if the student has met the criterion. If the student has not met the criterion, he is recycled to the test where he is required to apply the rule under appropriate situations.

If the student has met the criterion set for the learning objective he is given reinforcement. Following this step, a rest may be initiated prior to going on to learning the next rule.

Once all the rules have been mastered the next step involves making a status report on the student.

At this point in the flowchart students are presented with practical problems calling for the use of one of the rules already learned (in the rule pool). The student is recycled through a procedure of problem presentation, KOR, assessment of answers, the reduction of reinforcement if the answer is correct and the criterion has been met. If the student is not correct or does not meet the criterion, prompted examples are given until the students can apply all the rules to criterion without prompts.



This concludes the procedures followed in developing guidelines and activities for learning objectives categorized as rule learning and using.

APPENDIX A

LEARNING GUIDELINES AND FLOWCHARTS

SUB-CATEGORY 1: RULE LEARNING AND USING

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives; that is, what the trainee is expected to be able to do by the completion of training. Relate the objectives and learning activities to operational tasks which the trainee must perform in future real-world assignments.
2. Make sure that the student can recall and demonstrate the concepts which make up the rule. Then go on to learning the rule.
3. Require the learner to state the rule verbally. This verbal statement helps the learner recall which concepts make up the rule and how the concepts are arranged. This should usually be an informal statement of the rule in the learner's own words.
4. Present examples of when the rule applies, and when it doesn't.
5. Provide opportunities to apply the rule in a variety of new situations in which the learner has not previously been trained to apply the rule. During practice, practical applications and practice tests provide the student with immediate knowledge of results about his correct and incorrect answers. Provide rewards for correct application of the rule.
6. To test the learner's understanding of the rule, provide an unfamiliar situation in which the rule can be applied, and then require the learner to tell how the concepts of the rule are related to each other and to this situation in order to show that he is able to state how and why the rule can be applied.

7. Provide practice until the student achieves the desired level of performance; that is, until he learns the rules and learns to apply the rules he will use in the operational job setting.
8. Positive rewards of the student's correct applications of the rules learned is required in the early stages of training. Toward the end of training, the level of positive rewards for correct performance should be reduced to the same level that the student will find on the job.
9. Relate the rules to be learned to operational tasks which the trainee must perform in future real world assignments.
10. Different trainees will have different rates and styles of learning the material. It is better to use techniques which allow students flexibility in learning time.
11. Reduce forgetting by providing periodic practice or refresher training for infrequently used material.
12. In order for slower learners to reach the same level of proficiency as faster learners, time must be allowed for the slower learner to get as many positive rewards for correct applications of the rules learned as the faster learner.
13. Where it seems possible, supply students with diagrams, pictures, charts, graphs, rhymes, key words, and other association devices (mnemonics) which the student can use to relate what he already knows to what he is trying to learn. Also encourage students to make up their own mnemonics if they can and want to do it.

14. Pick out the features of the real world job environment which could be used to trigger the trainee's recall of associated materials which must be used in the rule using part of his job. Some features of the real world job setting where the rules will be applied can sometimes be used to trigger the recall of associated material that has not been directly trained that can be used in rule using.

15. Where the learner is having a particularly difficult time trying to learn and apply a rule, help him learn the rule by discovering how the concepts are related to each other by using specific questions which will help the learner to state the elements and relationships in the rule. Once the learner has discovered the rule elements by this method, he should be able to (1) easily recall the rule, (2) state the elements and their relationship in the rule, and (3) be able to apply the rule to job situations.

SUB-CATEOGRY 2: CLASSIFYING - RECOGNIZING PATTERNS

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the training objectives; that is, what the trainee is expected to be able to do by the completion of training. Organize the training material in such a way that the trainee can meet the training objectives at the end of training. Relate the objectives and learning activities to operational tasks which the trainee must perform in future real world assignments.
2. Call student attention to the important, distinctive features and characteristics of a pattern which distinguish this pattern from other patterns. Be sure that the distinctive features will be present in the student's real-world job environment, for these features are the cues by which the student must recognize the pattern.
3. Clearly display each of the distinctive features of the pattern under study. Show how these cues differ from each other (pre-differentiation of stimuli). Determine if the trainee can detect these distinctive features in patterns that are not to be classified or recognized in the training task.
4. Emphasize distinctive features which can be remembered in the form of mental "pictures" instead of abstract words. When possible, supply students with diagrams, pictures, charts, graphs, rhymes, acronyms, key words, self instructions, common associations, and other association devices like these to which the student can relate the material he is trying to learn. Also teach students to transform

distinctive features of the patterns into items that they can readily recall and make correct actions to.

5. In instructional presentations and practice, many examples and non-examples of the pattern should be presented. Toward the end of training, present examples and non-examples that will be very similar to each other in the job environment.
6. In early training there should be few irrelevant features, so that identifying the distinctive characteristics of the pattern is fairly easy. By the end of training, the number of irrelevant cues should be increased to correspond with the real-life situation.
7. Positive rewards of the students' correct recognizing of patterns is required in the early stages of training. Toward the end of training, the level of positive rewards for correct performance should be reduced to the same level that the student will find on the job.
8. Provide plenty of opportunities for students to practice making recognitions of each pattern being learned.
9. In practice and practice tests, provide for immediate knowledge of results to help the student meet the learning objectives by making each action of the task correct.
10. The pause following knowledge of results should be long enough to allow the student time to sort out his errors and pick out distinctive features of the pattern to be classified.
11. Provide the student with practice in recognizing examples from the full range of patterns produced by a given object. Make the examples

more similar as training progresses. At the end of training, the similarities in the examples should be the similarities that exist in the real world.

12. Provide a variety of examples of the pattern - select examples from the full range of variations in the pattern. Late in the learning stage, include distractions and false cues that might be found in the job setting.
13. Different trainees will have different rates and styles of learning the material. Try to provide flexibility in the time allowed.
14. In order for slower learners to reach the same level of proficiency as faster learners, time must be allowed for the slower learner to get as many or more positive rewards for correct answers as the faster learner.
15. Be sure that students develop a strong tendency to look for certain critical and distinctive patterns and develop the same kind of expectations they will need to have while on the job.
16. To test learning, require the trainee to provide new examples of the pattern, and to teach recognition of the pattern to someone else.
17. Require the student to overlearn the original material; that is, the student should continue to practice the required tasks after the point that simple mastery of the task has been met. Reduce forgetting by providing periodic opportunity to recall and apply infrequently used material.

SUB-CATEGORY 3: IDENTIFYING SYMBOLS

1. Clearly relate the learning objectives and learning activities to operational tasks, which the trainee must perform in future real world assignments.
2. If there are very similar symbols or features of parts of symbols which have been frequently confused in the past, then be sure that the students can tell the difference between the symbols or features of parts of symbols before they are taught actions to take for each one (predifferentiation of stimuli).
3. Break the overall learning task down into manageable steps or units when any of the following conditions exist:
    a. lower ability students
    b. complex material
    c. overall task contains many small parts

    The size of the set will depend upon the extent that the above conditions will be different from the normal conditions.
4. During instruction, the presentation of the symbol should be followed immediately by the presentation of its meaning (contiguity).
5. Change the order of presenting the material during practice so that each item in the list will be learned equally well and insure that the symbol and its meaning will appear together in the list to be learned.
6. When possible, supply students with diagrams, pictures, charts, graphs, rhymes, acronyms, key words, and other association devices (mnemonics) to which the student can relate what he is trying to learn. Also encourage the students to make up their own

association devices if they can and want to. Pick out features of the real world job environment which could be used to spark the trainees' recall of associated material which would likely be used in that part of this job. When possible, provide the students with association devices which will cause an emotional reaction in the student.

7. Allow for self-paced practice and provide the student with knowledge of the results of his identifications.
8. Reduce forgetting by providing periodic recall and practice for infrequently used material. Require the student to overlearn the original material; that is, the student should continue to practice the required tasks after the point that simple mastery of the task has been met.
9. Practice and test situations should require the student to make written or verbal answers so that the accuracy of his recall can be checked.
10. Different trainees will have different rates and styles of learning the material. Try to provide flexibility in learning time.
11. Positive reward of the student's correct identification of symbols and provision of immediate knowledge of result is required in the early stages of training. Toward the end of training, the level of positive rewards and knowledge of results should be reduced to the same level that the student will find on the job.

SUB-CATEGORY 4: DETECTING

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives; that is, what the trainee is expected to be able to do by the completion of training. Relate the learning objectives and learning activities to operational tasks which the trainee must perform in future real world assignments.
2. Train student to use systematic overall search procedures utilizing whatever senses (sight, hearing, etc.) are appropriate for the task. Provide examples of correct performance of the task where appropriate.
3. In presenting signals, sample from the full range of types of signals. Include the different signal sources to be encountered on the job and the different patterns of each signal source.
4. Train the student in techniques of vigilance:
    a. train him to establish a mental "set" to search. Use instructions to establish this "set" and provide a positive reward when the student achieves a proper "set."
    b. train the student to monitor his own vigilance level by conditioning him to respond to biological conditions (internal cues) which appear when vigilance begins to fade.
    c. where appropriate, train the student to use peripheral vision when scanning with the eyes.
5. Train the student in detection skills according to the following schedule:
    a. Early in training:
        1) provide a high signal density - more frequent than in operational task

2) signals should have high signal-to-noise ratio
3) use different amounts of time between signal presentations
4) insure a high frequency of student identifications of the signal
5) provide student with immediate and continuous knowledge of results
6) do not teach any vigilance techniques

b. During intermediate stage of training:
1) use a lower signal density
2) use lower signal-to-noise ratios
3) use different amounts of time between signal presentations
4) provide student with intermittent knowledge of results
5) introduce vigilance techniques

c. In advanced stage of training:
1) low signal density; i.e., operational density or minimum number suited to training
2) decrease signal-to-noise ratio to operational level
3) use different amounts of time between signal presentations
4) provide the student with knowledge of results equivalent to what he will receive on the job
5) require vigilance techniques appropriate to the job setting

6. Where it is possible for the signal to be detected by more than one sense, and when a student thinks he has detected the signal through one sense, train the student to use the detected signal as a cue to search for and verify the existence of the signal in a second sense modality.

7. Providing knowledge of results on correct detections can serve as positive reward to encourage vigilance behaviors that will lead to continued correct detections.
8. Ensure that detections are correct before providing positive reward.
9. Do not allow a student to leave one phase or level of the learning task until he has achieved the required level of mastery.

SUB-CATEGORY 5: MAKING DECISIONS

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives; that is, what the trainee is expected to be able to do by the completion of training. Relate the learning objectives and learning activities to operational tasks which the trainee must perform in future real world assignments.
2. For the most efficient learning of decision making the student must already have learned the technical knowledge which will allow him to:
    a. identify what the problem really is
    b. make a list of the most reasonable solutions
    c. determine which of the solutions would be best
3. The student will learn best if he is not afraid of making incorrect decisions in the training situations; this is particularly true in the early stages of training and in very complex decision making processes. Materials and instructors should, therefore, attempt to decrease student fears to a low level.
4. Give the students examples of these two types of actions which are to be avoided when making decision:
    a. response biases; that is, the tendency to make a "favorite" decision or use a "favorite" solution regardless of the real nature of the problem.
    b. perceptual sets; that is, the tendency to generalize problems or view several types of problems as if they were all the same when, in fact, they are quite different.

5. It is useful to teach the students a set of steps to follow in making decisions. The following 5-step model is suggested:
    a. Discover the existence of a problem and define it
    b. Identify and collect relevant information
    c. Develop reasonable solutions to the problem
        1) compare alternative solutions
        2) combine alternate solutions where desirable
    d. Evaluate each of the proposed solutions.
        1) How will each solution solve the problem?
        2) Will each solution bring about any additional benefits or problems?
        3) Rank each solution according to the results it would bring.
    e. Decide on the best solution and put it into effect.
6. Be sure that the student is provided with enough realistic information and data on which to formulate possible solutions and make final decisions; also, be sure that he makes decisions in the same variety of settings as he will face in carrying out his job.
7. Provide the student with a wide variety of decision making experiences. Provide basic problems where there are only a few factors to consider - solutions to these problems should range from easy to hard. Also provide complex problems which require the student to consider many factors - again, the solutions should range from easy to hard.
8. If the trainee will be required to make the decision under stress in the real world, then he must overlearn the decision making skill during training. That is, he must be able to make the correct

decision, and he must be able to make the decision efficiently, accurately, and repeatedly in distracting surroundings.

9. During the final stages of training, it is important to provide situations which closely duplicate the real world with respect to:
   a. amount of data
   b. type of data
   c. amount of time to complete the decision making problems
   d. amount of distraction and "noise" in the working environment

10. Provide the learner with knowledge of results (KOR) for each decision he makes. Here is a recommended list of questions to ask about the learner's problem solutions:
    a. Predictable? (Were evidences of perceptual sets shown in his solution?)
    b. Perseverated? (Were evidences of response biases shown in his solution?)
    c. Timely? (Is this the appropriate time to execute this particular decision?)
    d. Complete? (Did he consider all of the data and information?)
    e. Consistent? (Is his solution compatible and relevant to the data and the available information?)

Give KOR with respect to the above five criteria each time, and where possible, provide the actual consequences of the learner's decision as compared to his other alternatives.

SUB-CATEGORY 6: RECALLING BODIES OF KNOWLEDGE

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives; that is, what the trainee is expected to be able to do by the completion of training in a way that the trainee will meet the learning objectives.
2. Analyze the body of knowledge to detect key words or formulas or phrases or whatever. Then organize the learning activities around these key items.
3. Before testing for recalling bodies of knowledge, provide some warm-up exercises or an introduction to remind the student of the type of task and the type of information he will need.
4. Make the learning activities relevant by making them similar to real-life tasks that the student will be performing on the job.
5. If it is necessary for the student to learn similar bodies of subject matter, then either directly compare the bodies when they are first presented so that the student can tell them apart, or separate their presentations by as much time as possible to avoid confusion between them.
6. If the real world job will present the trainee very similar features of the situation which will require the trainee to remember different knowledge for each feature, then make sure that the trainee learns the difference between these features before he is taught which body of knowledge to associate with each feature (predifferentiation).

7. When possible, provide students with association devices which will cause an emotional reaction in the student.
8. When possible, supply students with diagrams, pictures, charts, graphs, rhymes, acronyms, key words, and other association devices (mnemonics) like these to which the student can relate the facts and principles he is trying to learn to help him recall more easily. Also encourage and give students directions to make up their own association devices if they can and want to.
9. Arrange for features of the real world job setting to be used to trigger the trainee's recall of associated material which in turn will trigger the knowledge he needs to do the job.
10. Try to use high interest, attention-getting features of the learning materials throughout the training. One way to keep student attention is to use learning activities which require active student participation.
11. In early phases of training, it is good to provide the student with guides, prompts, cues, and coaching which will help him remember the material correctly. As training progresses, this kind of help should be reduced until it matches the level of help that will be available in the real world job setting.
12. Provide students with opportunities to practice their training tasks by setting up a wide variety of testing and practice situations which are very similar to situations the learner will encounter on the job.
13. Practice and test situations should require the student to make written or verbal answers so that the accuracy of his recall of the facts and principles he learned can be checked.

14. During the training sessions provide the student with immediate knowledge of results (KOR) about his correct and incorrect answers. Provide positive rewards during the instruction, even during non-testing situations. Reward a student's progress, attitude, attention, mastery of an objective, etc. If a student is rewarded for working well, it is often more probable that he will continue to work well.
15. In practice and practice tests, provide for immediate knowledge of results to help the student retain correct answers and eliminate incorrect answers in the most efficient manner.
16. Change the order of presenting the material during practice so that each item in the list will be learned equally well.
17. Rest periods should be provided during practice sessions according to:
    a. need for rest as judged by the student
    b. requirements of the specific learning material as judged by the instructor
18. Different trainees will have different rates and styles of learning the material. Try to provide flexibility in time to learn. In order for slower learners to reach the same level of proficiency as faster learners, time must be allowed for the slower learner to get as many or more positive rewards for correct answers as the faster learner.
19. As training continues, give the learner chances to compare his progress and achievement with the stated learning objectives.
20. Test to see that the student is able to correctly recall key features that will help him recall the knowledge he needs in performing

his job. If not, provide more practice in associating the knowledge to be learned with these key features of the job setting.

21. Help prevent forgetting by:
    a. increasing the meaningfulness of the material by relating it to the learner's job environment and duties and by emphasizing the organization and structure of the material.
    b. requiring the student to overlearn the original material; that is, the student should continue to practice the required tasks after the point that simple mastery of the training task has been met.

SUB-CATEGORY 7: PERFORMING GROSS MOTOR SKILLS

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives. Relate the learning objectives and learning activities to operational tasks which the trainee must perform in future real world assignments.
2. Teach the learner to tell the difference between
   a. similar external cues (conditions, features, characteristics, etc. of objects in the job environment to which the learner must respond with an appropriate action) like knowing when too much pressure is put on a power saw the wood begins to smoke.
   b. similar internal cues (muscular feelings inside one's body which guide the execution of a physical skill and allow automatic responses) like knowing by the "feel" of the power saw how much pressure to use without burning the wood.
3. Different things should be emphasized in different stages of training:
   a. early in training
      1) present immediate and specific knowledge of results to the student
      2) present external cues that will bring out the desired responses in the student's actions
   b. later in training
      1) reduce the knowledge of results to on-the-job levels
      2) train the student to respond to internal cues in his muscles to guide his actions in correctly performing the task

4. If students make incorrect actions or begin to develop bad habits, present a penalty following these improper responses until they disappear.
5. Insure that the learner understands the tasks by requiring him to do the following:
    a. observe a correct performance of the task
    b. observe the component parts of the task being presented
    c. have student describe and demonstrate the component parts of the desired task
6. Require that the learner practice with regard to the following considerations:
    a. practice on parts (specific components) of the task:
        1) simple task-practice in entirety
        2) complex task practice in parts and then in entirety
    b. practice under varied conditions. This is done to:
        1) facilitate the performance of the motor task
        2) help adapt the performance of this task to potential environmental changes
    c. ensure that during practice the learners:
        1) understand the objectives of the skill while learning
        2) observe a skilled performance of the desired task as often as necessary
        3) obtain knowledge of results concerning his performance of the task
    d. have short rest periods mixed in with the practice periods

7. Give knowledge of results of the following kinds:
    a. evaluative--student learns:
        1) what he is doing right
        2) what he is doing wrong
    b. comparative--student learns how what he did compares to the:
        1) learning objectives of the program
        2) correct demonstration of task
        3) standards that are required in operational setting
8. The pause following knowledge of results should be longer than the time between the action and the knowledge of results to allow the student time to sort out his errors and to rest his muscles.
9. Reward performances which are closer to the goal than the preceeding performances. In this manner, the student's performance will become successively closer to the desired performance (shaping). After the student successfully reaches the desired performance, reduce the frequency of reward to the level found on the job.
10. Require the student to overlearn the original material; that is, the student should continue to perform the required tasks after the point that simple mastery of the task has been met.
11. Increase distractions, interruptions, and "noise" to the level that the person will encounter on-the-job (where appropriate).
12. Allow for individual variation in physical coordination and provide extra time and practice for those who learn the skills less readily.
13. Reduce forgetting by providing periodic practice for infrequently used skills.

SUB-CATEGORY 8: STEERING AND GUIDING - CONTINUOUS MOVEMENT

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives. Relate the learning objectives and activities to operational tasks which the trainee must perform in future real world assignments. Provide a preview of important, selected motions and movements that the student will learn to make.
2. Break the overall learning task down into manageable steps or units when any of the following conditions exist:
    a. lower ability students
    b. complex material

       the overall task contains many small parts and is so long that the student or instructor thinks that only a part of it at a time should be learned.
3. Ensure that the critical cues from which the trainee must get his information for correctly performing the task are realistic and continually available during the performance of the task.
4. Teach the student to scan continuously by specific training of eye movement and where to focus for scanning.
5. In continuous control task training, a high relationship to real-world conditions is required in:
    a. the presentation of the cues to which the trainee must react
    b. the actions and reactions which the trainee makes
    c. the way that the displays and controls of the system continuously respond to the trainee's control

6. Demonstrate correct task performance with a model.
7. Highly skilled performance requires extensive practice. This practice should contain:
    a. understanding of skill objectives
    b. observe skill performances
    c. practice task
    d. receive knowledge of results
    e. allow rest periods to be mixed in with the (distributed practice) practice periods when the trainee feels that he needs them.
8. Positive reward should be provided for performances which are closer to goal than preceeding performances. In this manner, the student's performance will become successively closer to the desired performance (shaping).
9. Give the student knowledge of results on small, distinct segments of his performance, especially during early stages of learning.
10. Positive reward should follow as soon as possible after each correct student performance, initially after each distinct segment of performance and toward the end of training after each maneuver or complete evolution.
11. Practice on specific component skills when learning complex tasks.
12. Practice under a variety of conditions.

SUB-CATEGORY 9: POSITIONING MOVEMENT AND RECALLING PROCEDURES

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives. Organize the training material in such a way that the trainee can easily identify and achieve the learning objectives throughout the training. Relate the objectives and learning activities to operational tasks which the trainee must perform in future real world assignments.
2. Break the physical skills (positioning movement) into logical sub-units or part skills. Then make sure that the procedural steps for each of these sub-units are well organized.
3. Break the overall learning task down into manageable steps or units when any of the following conditions exist:
   a. lower ability students
   b. complex material
   c. overall task contains many small parts
4. Provide a visual demonstration of the physical skill that the trainee is expected to perform at each step in the checklist of procedures.
5. If the checklist presents the trainee with similar checklist items which in the past have been frequently confused, then be sure that the trainee can explain the differences between these similar checklist items before he is taught which action to take for each one.
6. When possible, supply students with diagrams, pictures, charts, graphs, rhymes, acronyms, key words, and other association devices

(mnemonics) like these to which the student can relate the material he is trying to learn. Also encourage students to make up their own association devices if they can and want to.

7. When possible, provide students with association devices which will cause an emotional reaction in the student.
8. To help students remember a chain of procedures, it is useful to practice:
    a. identifying each checklist item and explaining or performing its corresponding procedure
    b. identifying a group of checklist items (as many as the student can handle at once) and explaining or performing their corresponding procedural steps - the first items of each group should overlap with the last items of the previously studied group
    c. identifying all of the checklist items and explaining or performing their corresponding procedural steps
9. Help students to use association devices that are easily changed into a form that is easier to remember to aid in the recall of procedures, then encourage students to mentally practice running through the steps in the checklist.
10. Ensure that the trainee has a lot of opportunity to practice the physical skills early in the training. These five steps provide a good outline for practice:
    a. be sure the trainee understands the learning objectives
    b. provide a visual demonstration of the correct performance

c. allow the trainee to practice part-skills and provide feedback to train him to perfect the movement.

d. integrate the part-skills into a smooth sequence

e. provide feedback so the trainee can improve his performance

11. The following conditions should be provided in earlier and later stages of training:

a. Earlier stages of training

1) immediate and frequent knowledge of results

2) immediate and frequent positive reward

3) few or no distractions

4) learning material broken down into small, easily learned parts

5) items are relatively easy to learn

6) provide guides, prompts, cues, and coaching to aid learning

b. Later stages of training

1) occasional, delayed feedback

2) occasional, delayed reward of students' correct movements

3) distractions and interferance are similar to what will be found on the job

4) learning material to be recalled and used as it would be on the job

5) the material should be as complex as that to be used on the job

6) add the amount of distractions that would be found on the job

7) use no guides or prompts that would not be found on the job

12. Positive reward should follow as soon as possible after a correct answer.

13. The pause following knowledge of results should be long enough to allow the student time to sort out his errors or mentally confirm his correct answer (post-feedback delay).

14. Pick out features of the real world job enviroment which could be used to spark the trainees' recall of associated material which must be used in that part of his job. Actual parts of the material being learned can sometimes be used to spark the student's recall of other parts of the material.

15. Rest periods should be provided during practice sessions according to:
    a. need for rest as judged by the student
    b. requirements of the specific learning material as judged by the instructor

16. These types of tasks should be overlearned through extensive practice. Often just doing one step in a procedure or activity will automatically remind one of what step comes next.

17. In order for slower learners to reach the same level of proficiency as faster learners, time must be allowed for the slower learner to get as many or more positive rewards for correct answers as the faster learner.

18. Two guidelines on the amount of realism required for procedural and physical skill practice are:
    a. equipment realism can be at a minimum level; for example, a photo of the job setting or a paper and plywood model
    b. checklist items and their corresponding procedural responses need to be as realistic as possible

19. As training continues, occasionally give the learner chances to compare his progress and achievement with the stated course objectives.
20. Train the student to the level of proficiency required on the job. Facilitate acquisition of the material by relating it to on-the-job duties, responsibilities, advancement, or survival.
21. Reduce forgetting by providing periodic practice for infrequently used procedures.

SUB-CATEGORY 10: VOICE COMMUNICATING

1. At the beginning of the training, the instructor or the materials should clearly inform the trainee of the learning objectives. Organize the training material in such a way that the trainee can easily identify and meet the learning objectives. Relate the learning objectives and activities to operational tasks which the trainee must perform in future real world assignments.
2. Present a brief overview of the activities in which the students will participate during training.
3. Break up the material into separate, distinctive types of voice communication that appear on the job.
4. Identify similar cues (sounds, words, groups of words, vocal patterns, etc.) that are often confused in communications of this type and test the student to be sure that he can tell the difference between them.
5. Point out critical cues and performances that are different from habitual (everyday type) voice communication.
6. Teach the student to be mentally alert for the specific voice communications being taught; that is, teach the student to listen for certain words and phrases (perceptual set).
7. Before demonstrating specific procedures and techniques, teach general voice communication terminology and procedure (see "recalling bodies of knowledge" for this).
8. Demonstrate a given voice procedure with examples of correct performance. Be sure the learner observes critical cues and the appropriate responses that he should make to them.

9. Require enough practice trials of the learner to produce the correct performance; he should especially practice parts he is having difficulty with until he can demonstrate the correct procedure.
10. During practice, practical applications, and practice tests, provide the student with immediate knowledge of results about his correct and incorrect answers. Positive reward should follow as soon as possible after a correct answer.
11. Rest periods should be provided during practice sessions (distributed practice) according to:
    a. need for rest as judged by the student
    b. requirements of the specific learning material as judged by the instructor.
12. Toward the end of training, increase stress and miscellaneous interruptions, distractions, and "noise" to the level that will appear on the job.
13. Practice voice communication procedures to the level that they will have to be performed in the job setting; this may require some practice in team training with voice communication.
14. Cross train the learner so that he may perform other voice communication tasks so that he may act as a replacement for other members of his team.
15. Require the student to overlearn the original material; that is, the student should continue to practice the required tasks after the point that simple mastery of the task has been met.

16. Reduce forgetting by providing periodic practice for infrequently used material.
17. Provide a large reward when trainee meets overall training objectives and required overlearning.

SUB-CATEGORY 11: ATTITUDE LEARNING

There are three separate components of an attitude that must be dealt with separately. They are: (A) the affective component (feelings, emotion), (B) the cognitive component (perception, knowledge, information), and (C) the behavioral component (responses, acts, deeds). The learning guidelines will be separated into groups that support each of these components. It is important to know that there are recognized alternative ways of achieving each component, so the guidelines should be used as a menu from which you choose appropriate items for each of the three groups. It is usually unnecessary and impractical to use all of the guidelines in a group. The more powerful guidelines are listed last in each section.

A. Affective Component - to produce in the student the desired feelings and emotions

1. Attempt to get the student to identify with a group of people which has the desired attitude as a group norm. (The majority of the people already believe it.)
    a. Persuade him of the desirability of belonging to such a group.
    b. Reward him for affiliating and identifying with such a group.
    c. When appropriate, punish him when he shows identification with a group not holding the desired attitude as a group norm.

   d. Show desirability of belonging to such a group by establishing that:
      1) those he likes, respects, and wants to associate with, already belong to such a group (if possible)
      2) those who belong to such a group receive rewards and have a reduction in anxiety level (don't have to live in fear of doing the wrong thing)

2. Provide positive rewards to the student only when he displays his closest approximation of the attitude or displays the exact attitude. Punish demonstrations of incompatible, undesirable attitudes.

3. Use social learning (imitation) of respected people to train the student to adopt the desired attitude. Do this by demonstrating:
   a. people the student likes, respects, or wants to associate with being rewarded after a behavior that resulted from showing the desired attitude.
   b. people the student likes, respects, or wants to associate with being punished following a behavior that was incompatible with having desired attitudes.

B. Cognitive Component - to produce the perceptions, knowledge, and information necessary for the desired attitude

1. Repeatedly present to the student a description of the desired attitude or behavior until the person adopts or carries out this desired attitude.

2. Communicate to the student the fact that the beliefs of his associates or important groups of people or authority figures differ from his own initial beliefs about the desired attitude. Continue to present this type of information until the student makes the appropriate change in attitude.
3. Produce uncertainty within the subject about his beliefs by identifying contradictions between two or more of the beliefs which he holds.
4. Ensure that other members of the group of people with whom the student studies, socializes, and lives, present specific arguments for the cognitive components of the desired attitude, and counterarguments tailored to meet the student's objections to the desired attitude.
5. Present a previously prepared message to the student presenting arguments why he should adopt the cognitive component of the desired attitude. Some of the guidelines to be observed concern:
    a. the characteristics of the person presenting the message:
        1) he has high credibility because he is an expert (knows correct stand on issue, desired attitude) and because he is trustworthy (communicates knowledge without showing prejudices)
        2) initially in his message, the persuader appears highly creditable by expressing views already held

by the student on subjects that may not even be relevant to the attitude being taught

3) asks for a large change in subjects attitude (bigger than he really thinks the person will change)

b. how the issue should be presented:

1) provide few (if any) reasons for engaging in behaviors incompatible with the desired attitude

2) only use fear as a means of turning students away from undesirable attitudes when the behaviors produced by the desired attitude are easy to describe and perform

3) present only one side of the argument when:

    a) the audience is generally friendly

    b) only an immediate, temporary attitude change is desired

4) present both sides of the argument when:

    a) the student starts out disagreeing with the desired attitude

    b) it is likely that the person will hear the other side anyway

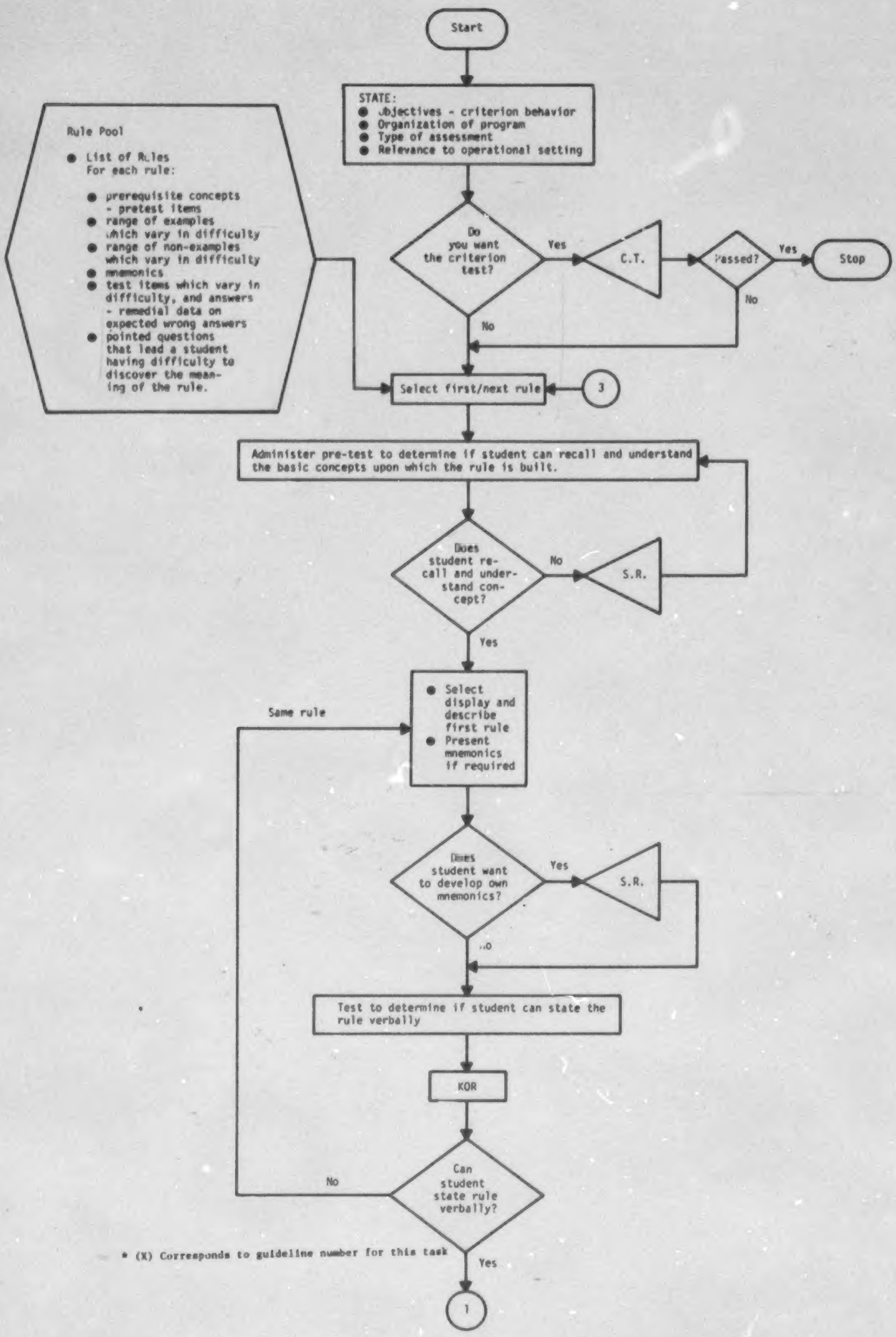
5) when opposite views are presented one after another, the one presented last will be more effective for attitude change

6) explicitly state conclusions, except when the student is rather intelligent

7. Intensively indoctrinate the student by using a combination of approaches including:
    - a. frequent repetitions of the descriptions of the attitude
    - b. communications about the average beliefs of the student's friends and associates
    - c. tailored arguments to counter student's resistance to change
    - d. prepared arguments attributed to a highly respected person or group of people

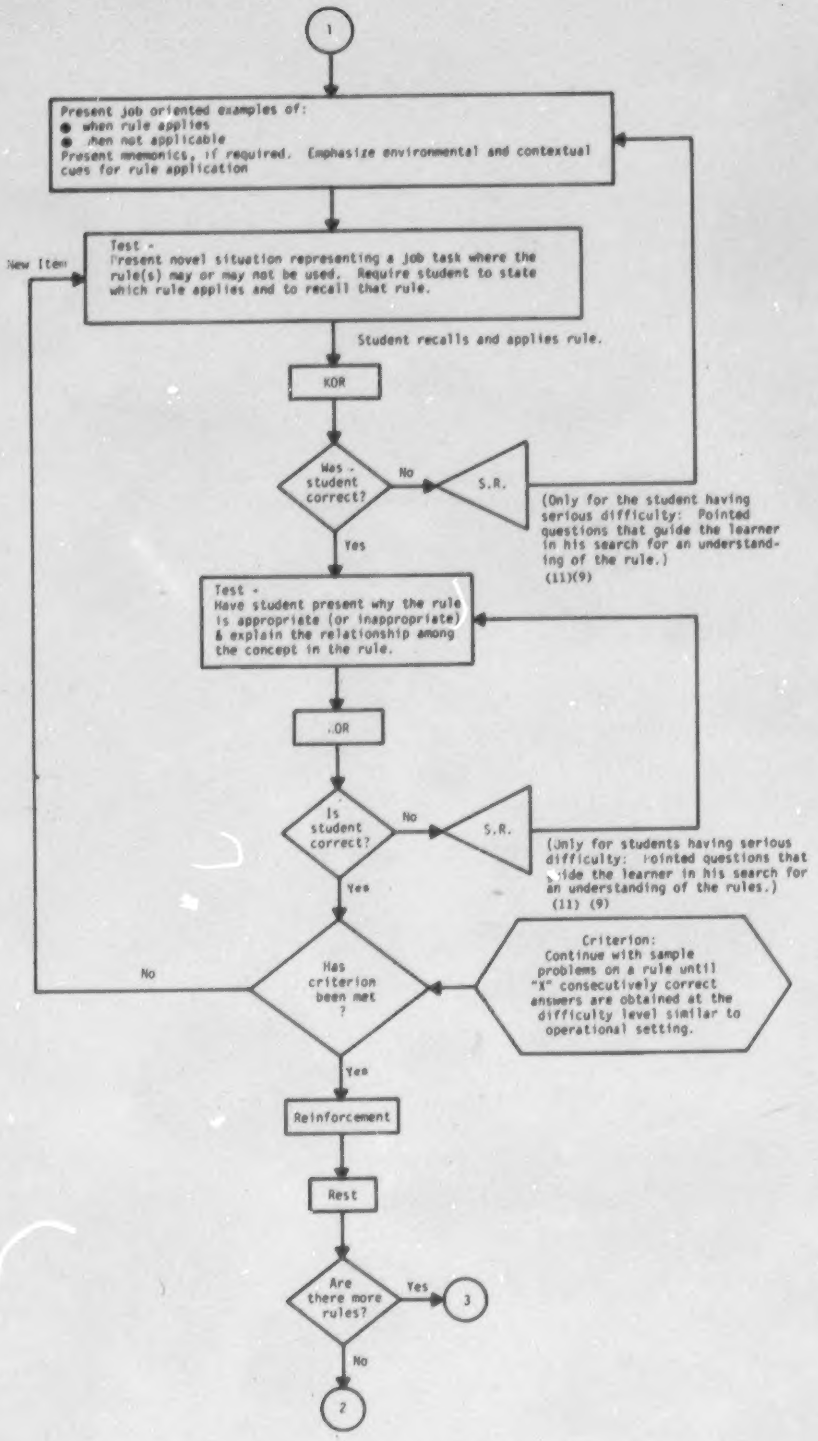
C. Behavioral Component - to develop the responses, actions, deeds, and performance related to the desired attitude

1. Require the student to "act out" the behavioral aspect of the attitude by either role playing or performing the desired behavior in the job setting.
2. Encourage the student to publicly announce his belief in and allegiance to the desired attitude, in front of his work-mates and associates.
3. Provide positive rewards for any behavior that seems to be a product of or is in conformance with the desired attitude. Reinforcement will provide the desired feedback.

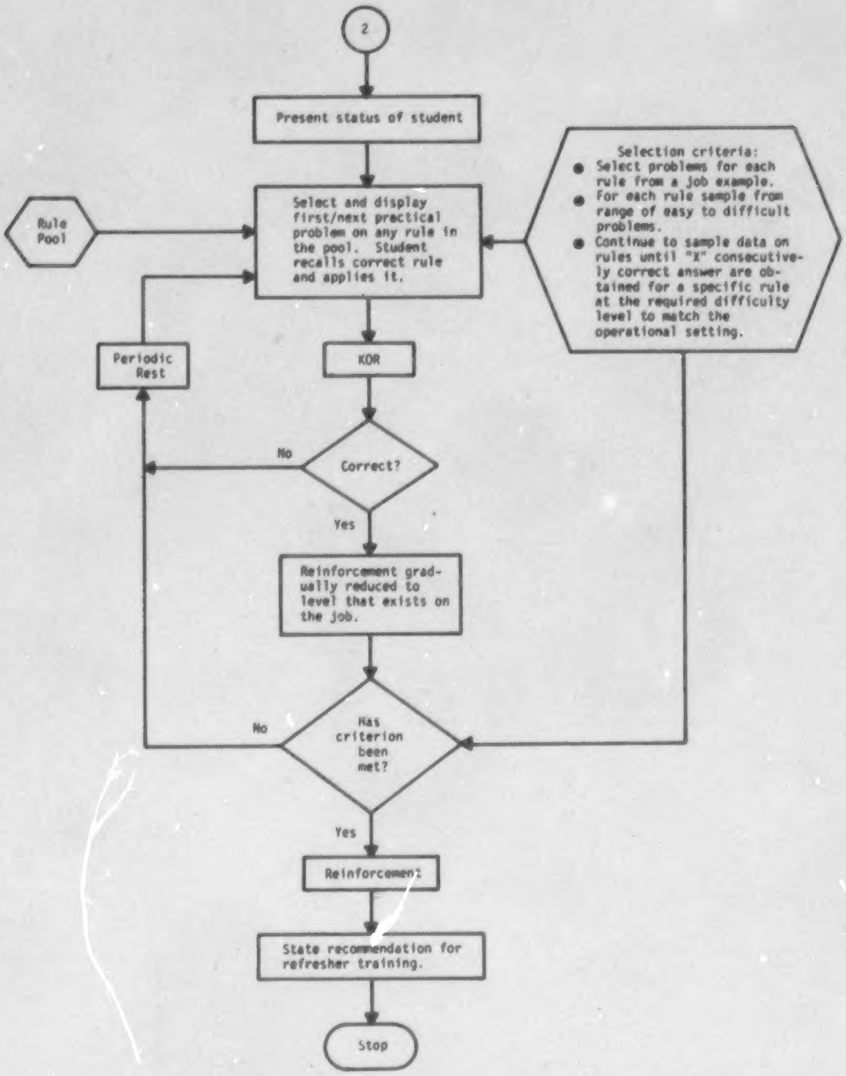

Start
STATE:
Objectives - criterion behavior
Organization of program
Type of assessment
Relevance to operational setting
Rule Pool
List of Rules
For each rule:
prerequisite concepts
- pretest items
range of examples
which vary in difficulty
range of non-examples
which vary in difficulty
mnemonics
test items which vary in difficulty, and answers
- remedial data on expected wrong answers
pointed questions that lead a student having difficulty to discover the meaning of the rule.
Do you want the criterion test?
Yes
C.T.
Passed?
Yes
Stop
No
No
Select first/next rule
3
Administer pre-test to determine if student can recall and understand the basic concepts upon which the rule is built.
Does student recall and understand concept?
No
S.R.
Yes
Same rule
Select display and describe first rule
Present mnemonics if required
Does student want to develop own mnemonics?
Yes
S.R.
No
Test to determine if student can state the rule verbally
KOR
Can student state rule verbally?
No
Yes
1

* (X) Corresponds to guideline number for this task

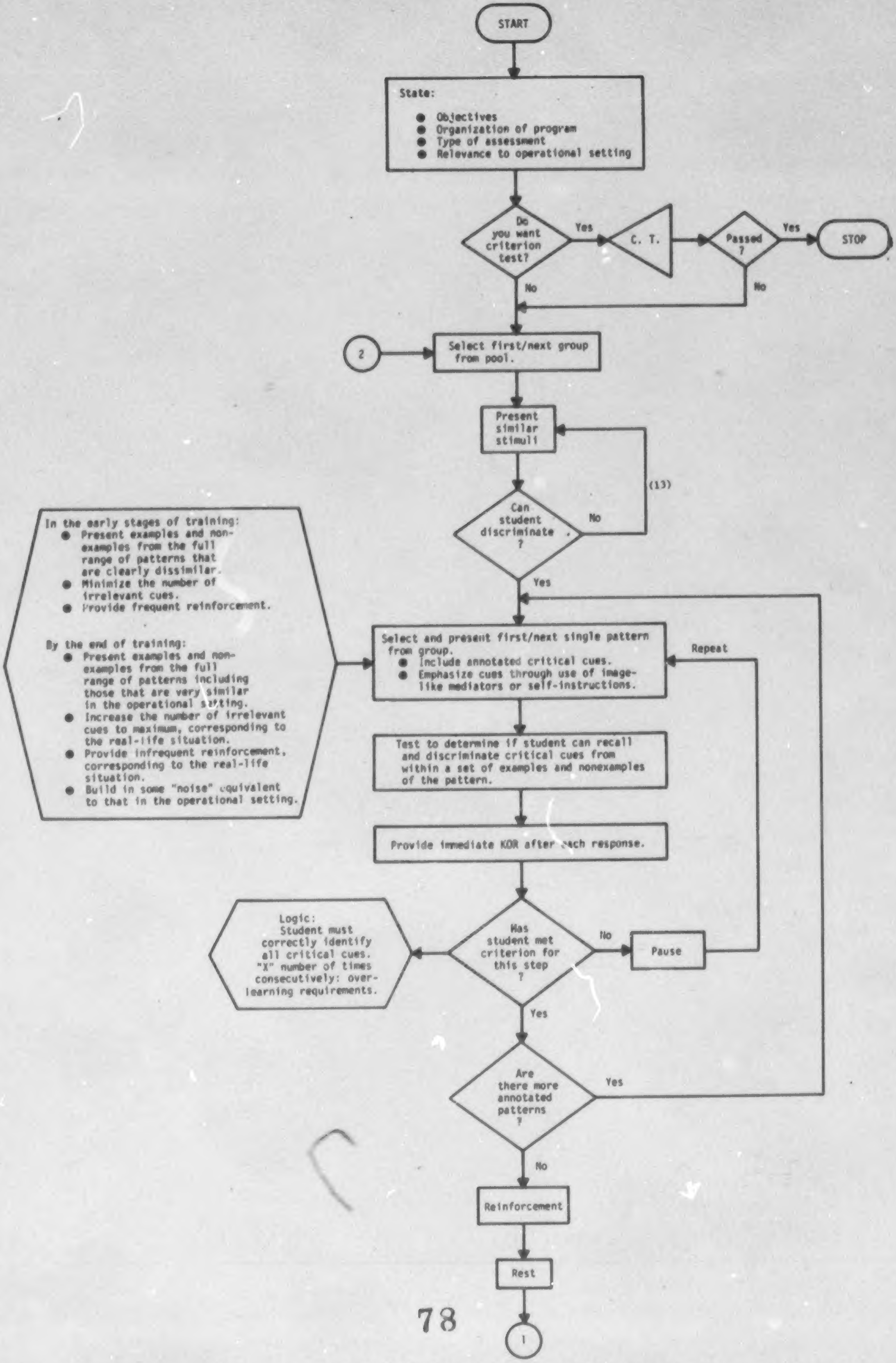
SUB-CATEGORY 1: RULE LEARNING AND USING


1
Present job oriented examples of:
● when rule applies
● when not applicable
Present mnemonics, if required. Emphasize environmental and contextual cues for rule application
New Item
Test -
Present novel situation representing a job task where the rule(s) may or may not be used. Require student to state which rule applies and to recall that rule.
Student recalls and applies rule.
KOR
Was student correct?
No
S.R.
(Only for the student having serious difficulty: Pointed questions that guide the learner in his search for an understanding of the rule.)
(11)(9)
Yes
Test -
Have student present why the rule is appropriate (or inappropriate) & explain the relationship among the concept in the rule.
KOR
Is student correct?
No
S.R.
(Only for students having serious difficulty: Pointed questions that guide the learner in his search for an understanding of the rules.)
(11) (9)
Yes
No
Has criterion been met ?
Criterion:
Continue with sample problems on a rule until "X" consecutively correct answers are obtained at the difficulty level similar to operational setting.
Yes
Reinforcement
Rest
Are there more rules?
Yes
3
No
2

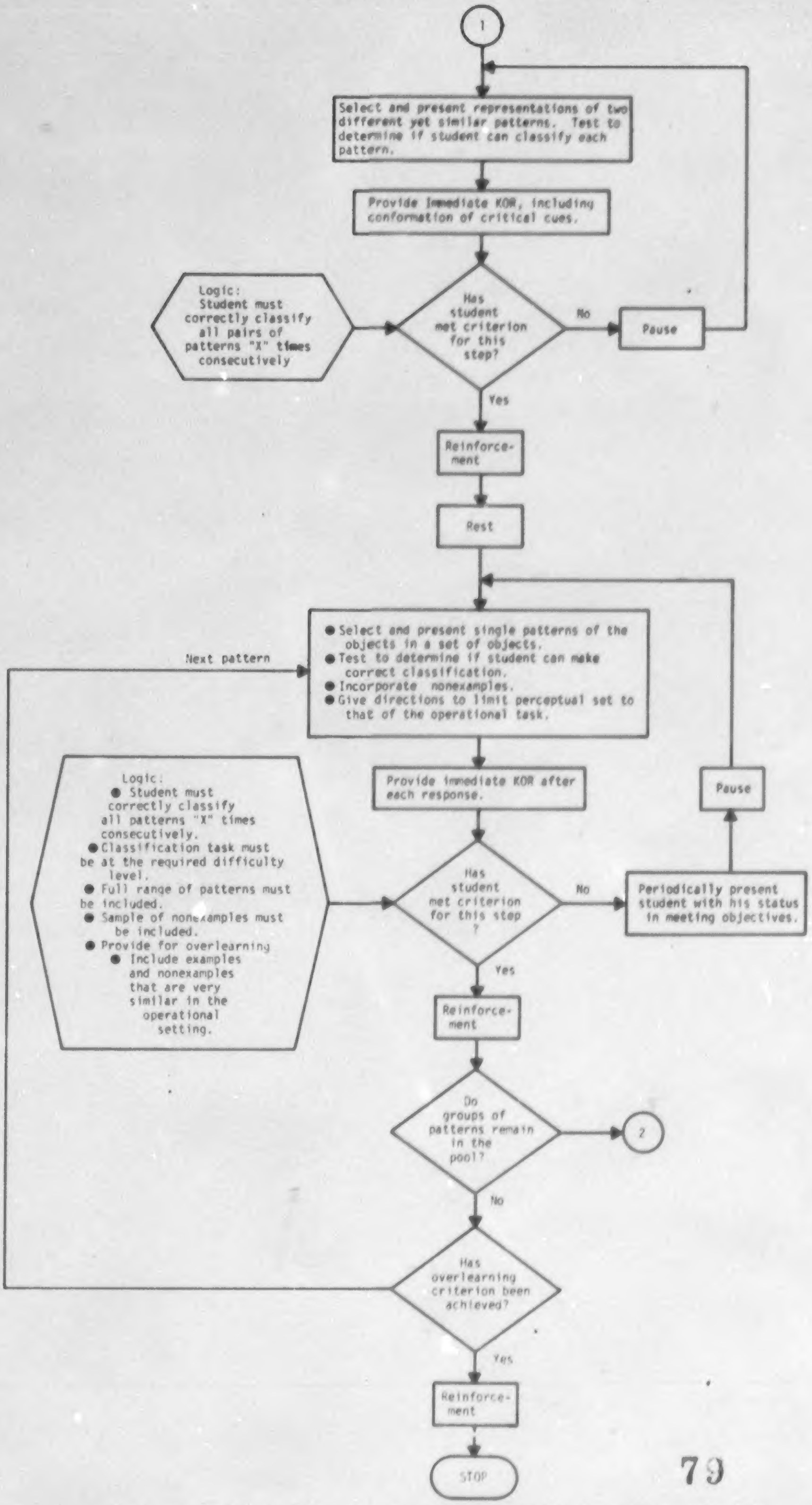
SUB-CATEGORY 1: RULE LEARNING AND USING (Con't)


2
Present status of student
Rule Pool
Select and display first/next practical problem on any rule in the pool. Student recalls correct rule and applies it.
Selection criteria:
● Select problems for each rule from a job example.
● For each rule sample from range of easy to difficult problems.
● Continue to sample data on rules until "X" consecutively correct answer are obtained for a specific rule at the required difficulty level to match the operational setting.
Periodic Rest
KOR
No
Correct?
Yes
Reinforcement gradually reduced to level that exists on the job.
No
Has criterion been met?
Yes
Reinforcement
State recommendation for refresher training.
Stop

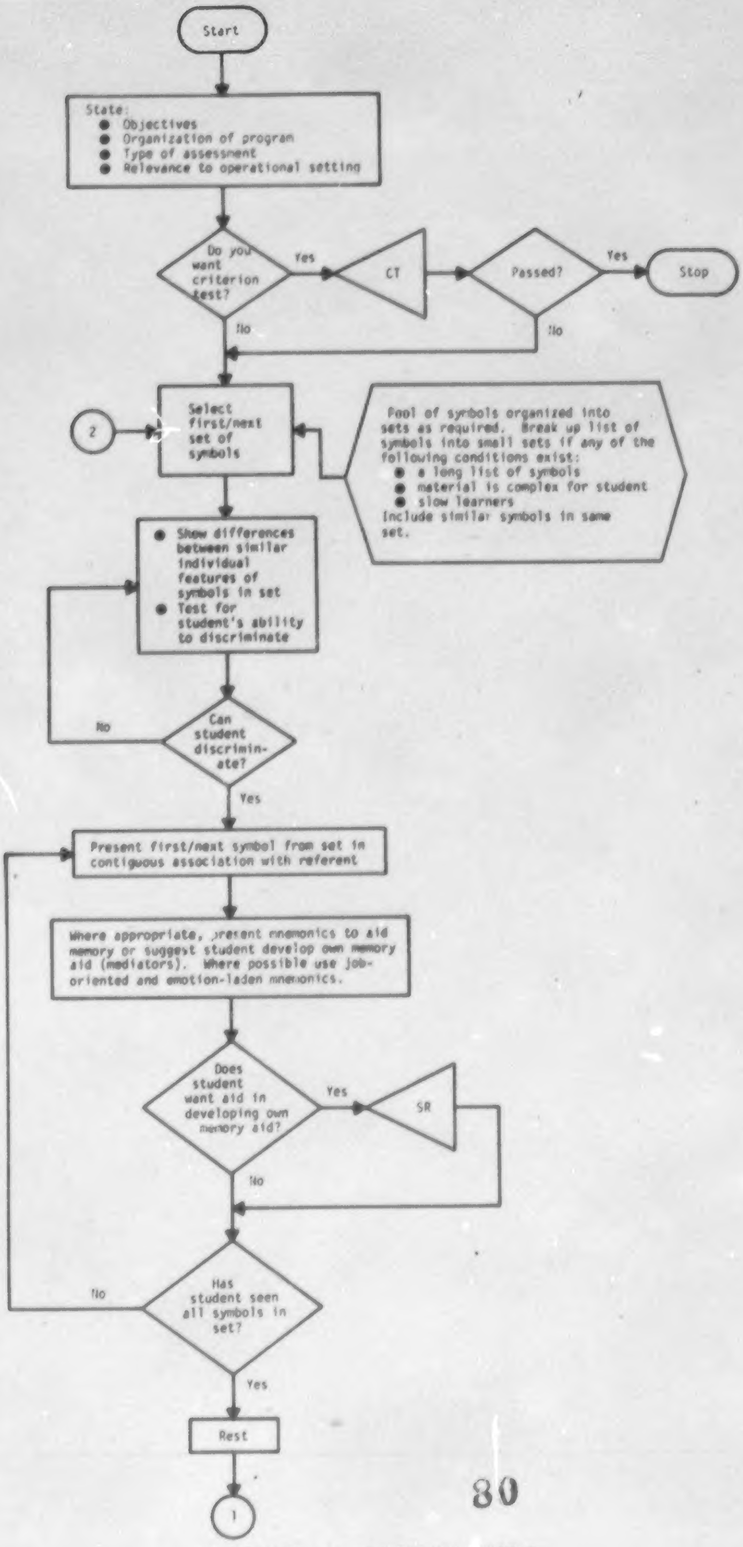
SUB-CATEGORY 1: RULE LEARNING AND USING (Con't)


START
State:
Objectives
Organization of program
Type of assessment
Relevance to operational setting
Do you want criterion test?
Yes
C. T.
Passed ?
Yes
STOP
No
No
2
Select first/next group from pool.
Present similar stimuli
(13)
Can student discriminate ?
No
Yes
In the early stages of training:
Present examples and non-examples from the full range of patterns that are clearly dissimilar.
Minimize the number of irrelevant cues.
Provide frequent reinforcement.
By the end of training:
Present examples and non-examples from the full range of patterns including those that are very similar in the operational setting.
Increase the number of irrelevant cues to maximum, corresponding to the real-life situation.
Provide infrequent reinforcement, corresponding to the real-life situation.
Build in some "noise" equivalent to that in the operational setting.
Select and present first/next single pattern from group.
Include annotated critical cues.
Emphasize cues through use of image-like mediators or self-instructions.
Repeat
Test to determine if student can recall and discriminate critical cues from within a set of examples and nonexamples of the pattern.
Provide immediate KOR after each response.
Logic: Student must correctly identify all critical cues. "X" number of times consecutively: over-learning requirements.
Has student met criterion for this step ?
No
Pause
Yes
Are there more annotated patterns ?
Yes
No
Reinforcement
Rest
1

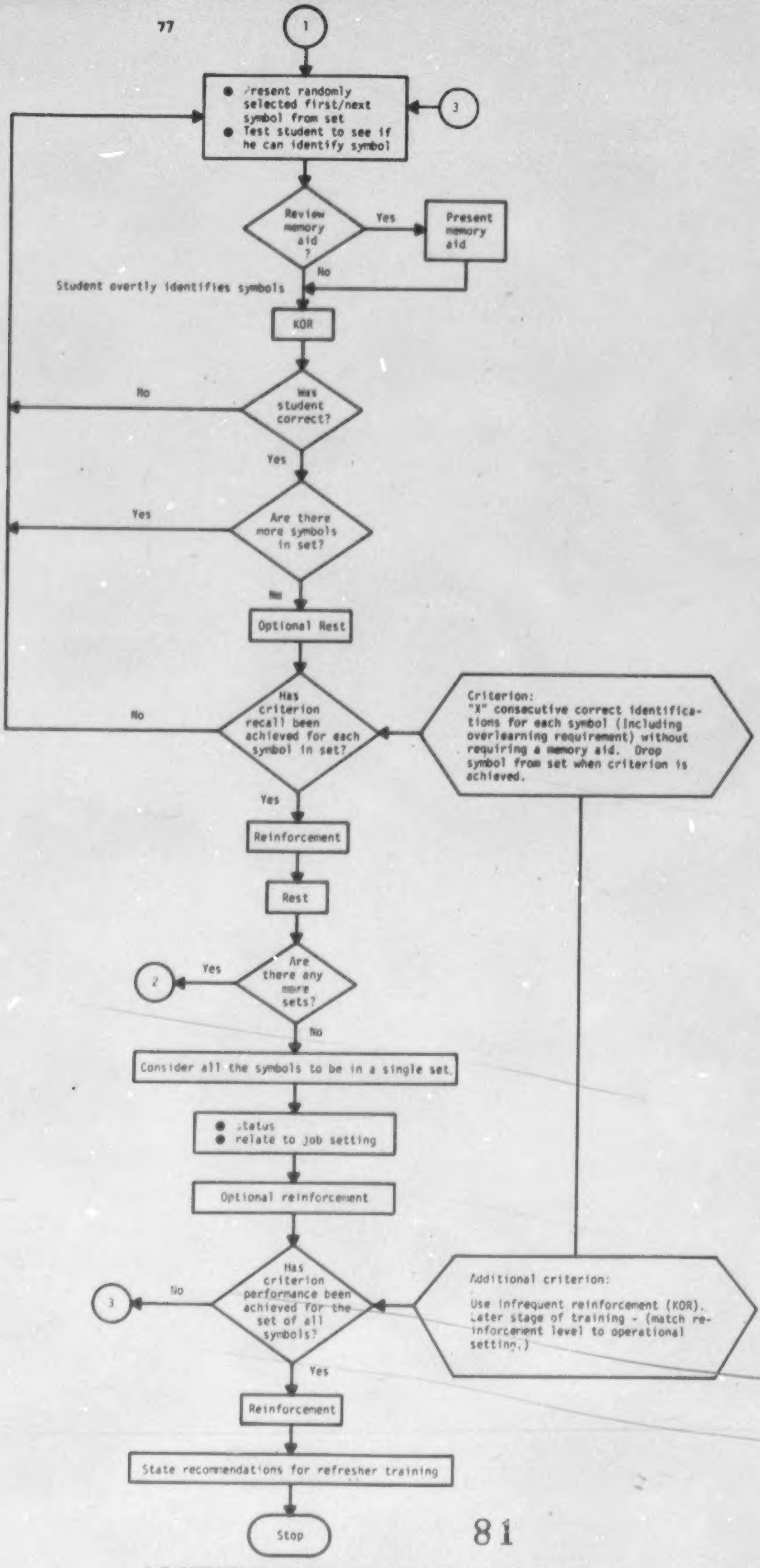
SUB-CATEGORY 2: CLASSIFYING - RECOGNIZING PATTERNS


1
Select and present representations of two different yet similar patterns. Test to determine if student can classify each pattern.
Provide immediate KOR, including conformation of critical cues.
Logic: Student must correctly classify all pairs of patterns "X" times consecutively
Has student met criterion for this step?
No
Pause
Yes
Reinforcement
Rest
Select and present single patterns of the objects in a set of objects.
Test to determine if student can make correct classification.
Incorporate nonexamples.
Give directions to limit perceptual set to that of the operational task.
Next pattern
Provide immediate KOR after each response.
Pause
Logic:
Student must correctly classify all patterns "X" times consecutively.
Classification task must be at the required difficulty level.
Full range of patterns must be included.
Sample of nonexamples must be included.
Provide for overlearning
Include examples and nonexamples that are very similar in the operational setting.
Has student met criterion for this step?
No
Periodically present student with his status in meeting objectives.
Yes
Reinforcement
Do groups of patterns remain in the pool?
2
No
Has overlearning criterion been achieved?
Yes
Reinforcement
STOP

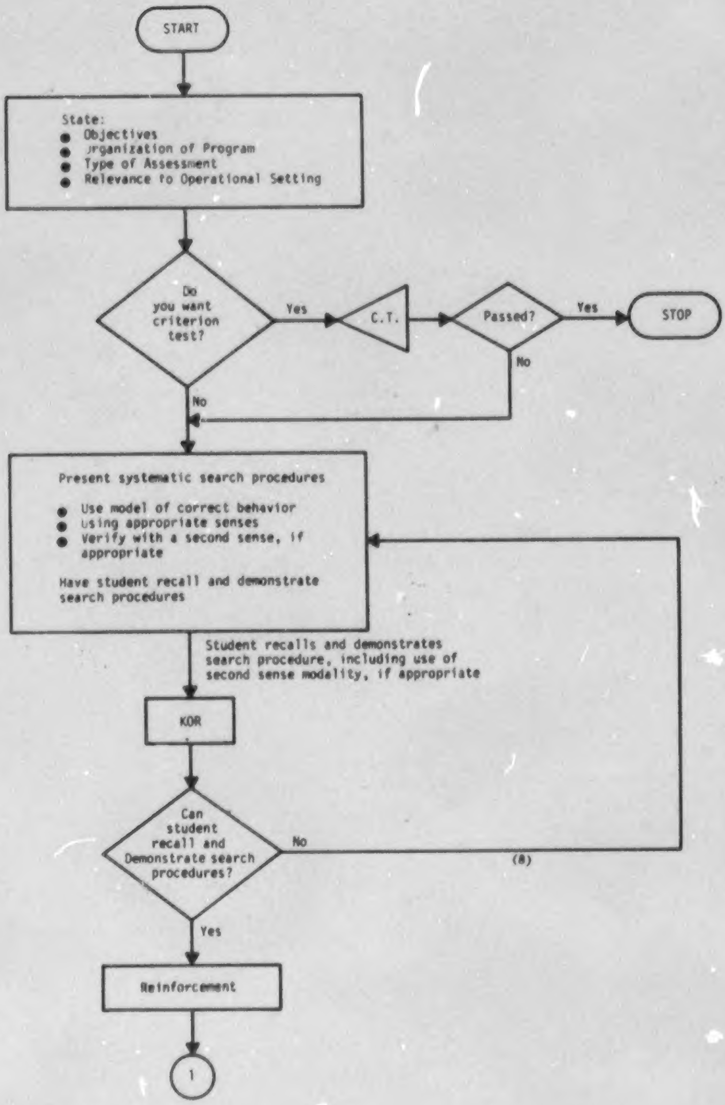
SUB-CATEGORY 2: CLASSIFYING - RECOGNIZING PATTERNS (Con't)


Start
State:
● Objectives
● Organization of program
● Type of assessment
● Relevance to operational setting
Do you want criterion test?
Yes
CT
Passed?
Yes
Stop
No
No
Select first/next set of symbols
2
Pool of symbols organized into sets as required. Break up list of symbols into small sets if any of the following conditions exist:
● a long list of symbols
● material is complex for student
● slow learners
Include similar symbols in same set.
● Show differences between similar individual features of symbols in set
● Test for student's ability to discriminate
Can student discriminate?
No
Yes
Present first/next symbol from set in contiguous association with referent
Where appropriate, present mnemonics to aid memory or suggest student develop own memory aid (mediators). Where possible use job-oriented and emotion-laden mnemonics.
Does student want aid in developing own memory aid?
Yes
SR
No
Has student seen all symbols in set?
No
Yes
Rest
1

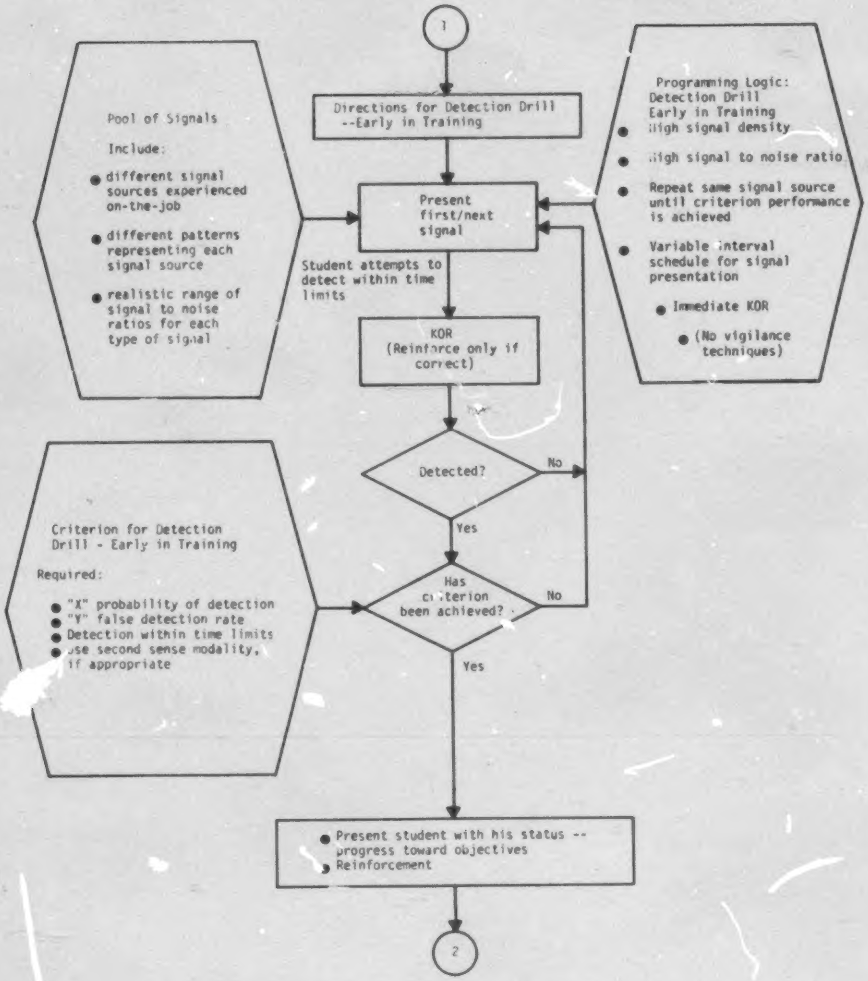
SUB-CATEGORY 3: IDENTIFYING SYMBOLS


1
Present randomly selected first/next symbol from set
Test student to see if he can identify symbol
3
Review memory aid ?
Yes
Present memory aid
No
Student overtly identifies symbols
KOR
Was student correct?
No
Yes
Are there more symbols in set?
Yes
No
Optional Rest
Has criterion recall been achieved for each symbol in set?
No
Criterion:
"X" consecutive correct identifications for each symbol (Including overlearning requirement) without requiring a memory aid. Drop symbol from set when criterion is achieved.
Yes
Reinforcement
Rest
Are there any more sets?
Yes
2
No
Consider all the symbols to be in a single set.
Status
relate to job setting
Optional reinforcement
Has criterion performance been achieved for the set of all symbols?
No
3
Additional criterion:
Use infrequent reinforcement (KOR). Later stage of training - (match reinforcement level to operational setting.)
Yes
Reinforcement
State recommendations for refresher training
Stop

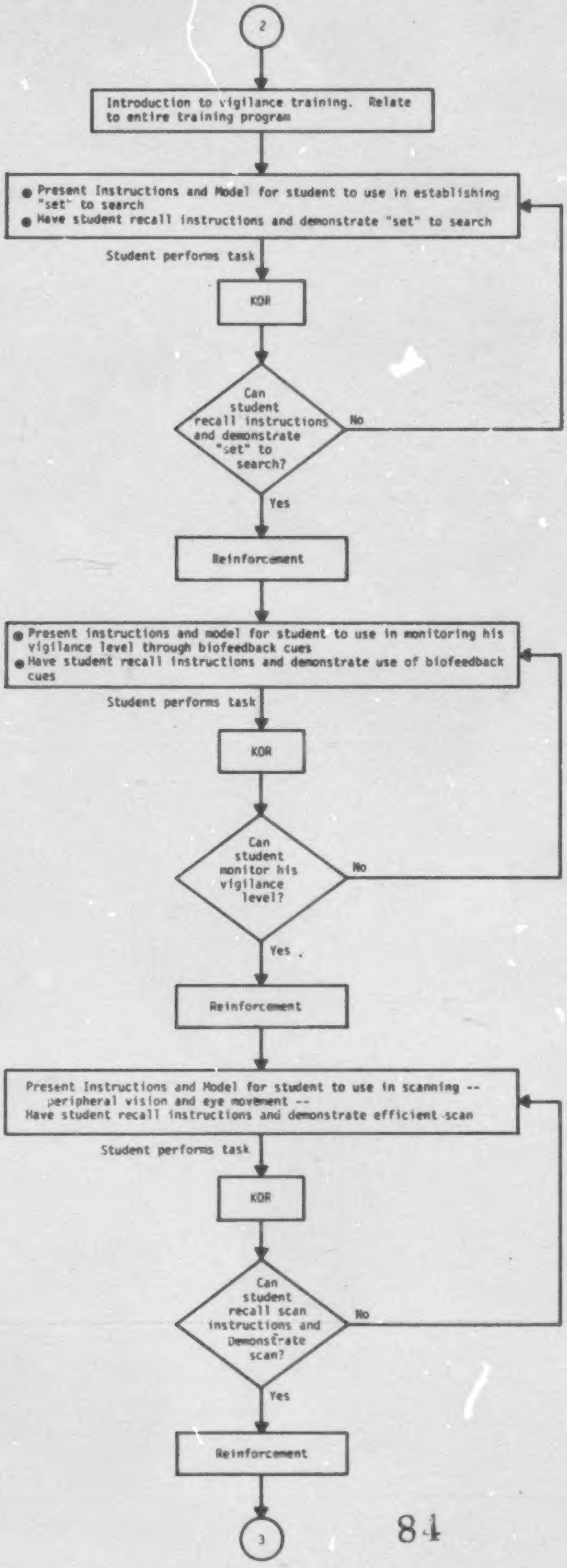
SUB-CATEGORY 3: IDENTIFYING SYMBOLS (Con't)


START
State:
Objectives
Organization of Program
Type of Assessment
Relevance to Operational Setting
Do you want criterion test?
Yes
C.T.
Passed?
Yes
STOP
No
No
Present systematic search procedures
Use model of correct behavior
Using appropriate senses
Verify with a second sense, if appropriate
Have student recall and demonstrate search procedures
Student recalls and demonstrates search procedure, including use of second sense modality, if appropriate
KOR
Can student recall and Demonstrate search procedures?
No
(8)
Yes
Reinforcement
1

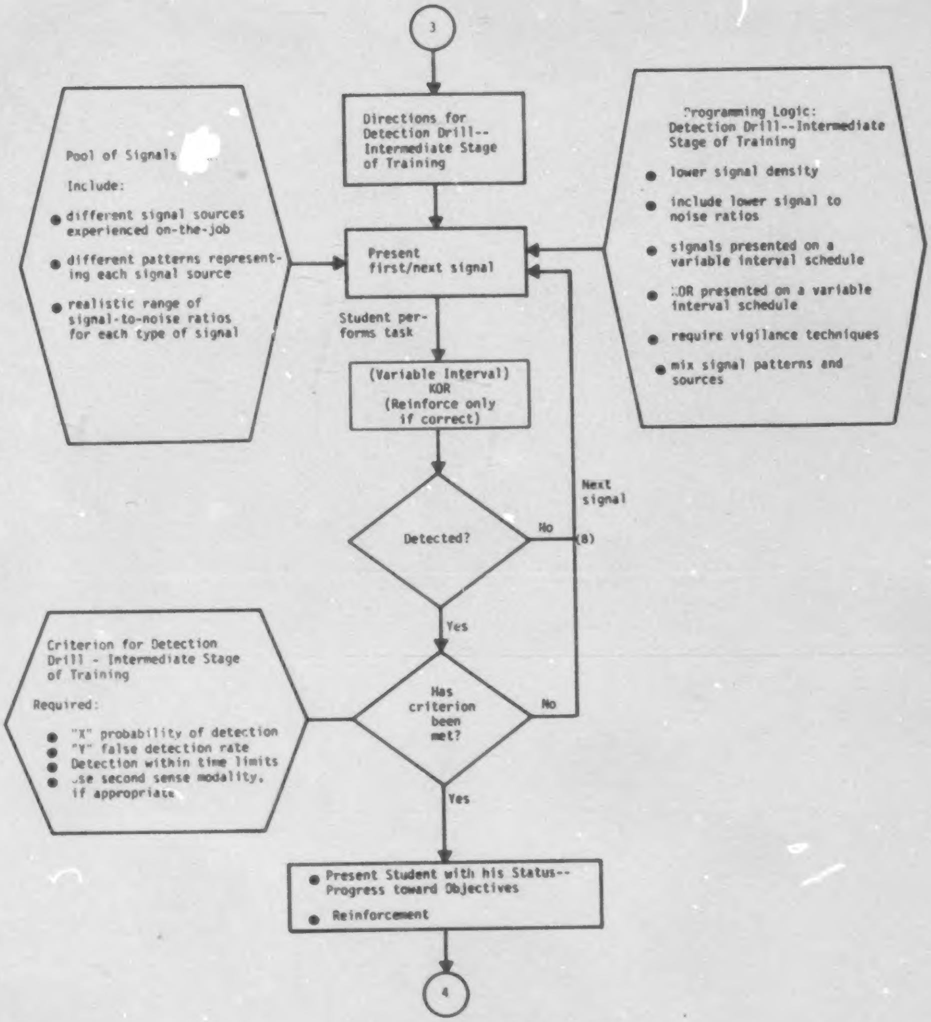
SUB-CATEGORY 4: DETECTING


1
Directions for Detection Drill
--Early in Training
Pool of Signals
Include:
● different signal sources experienced on-the-job
● different patterns representing each signal source
● realistic range of signal to noise ratios for each type of signal
Present first/next signal
Programming Logic:
Detection Drill
Early in Training
● High signal density
● High signal to noise ratio
● Repeat same signal source until criterion performance is achieved
● Variable interval schedule for signal presentation
● Immediate KOR
● (No vigilance techniques)
Student attempts to detect within time limits
KOR
(Reinforce only if correct)
Detected?
No
Yes
Criterion for Detection Drill - Early in Training
Required:
● "X" probability of detection
● "Y" false detection rate
● Detection within time limits
● Use second sense modality, if appropriate
Has criterion been achieved?
No
Yes
● Present student with his status -- progress toward objectives
● Reinforcement
2

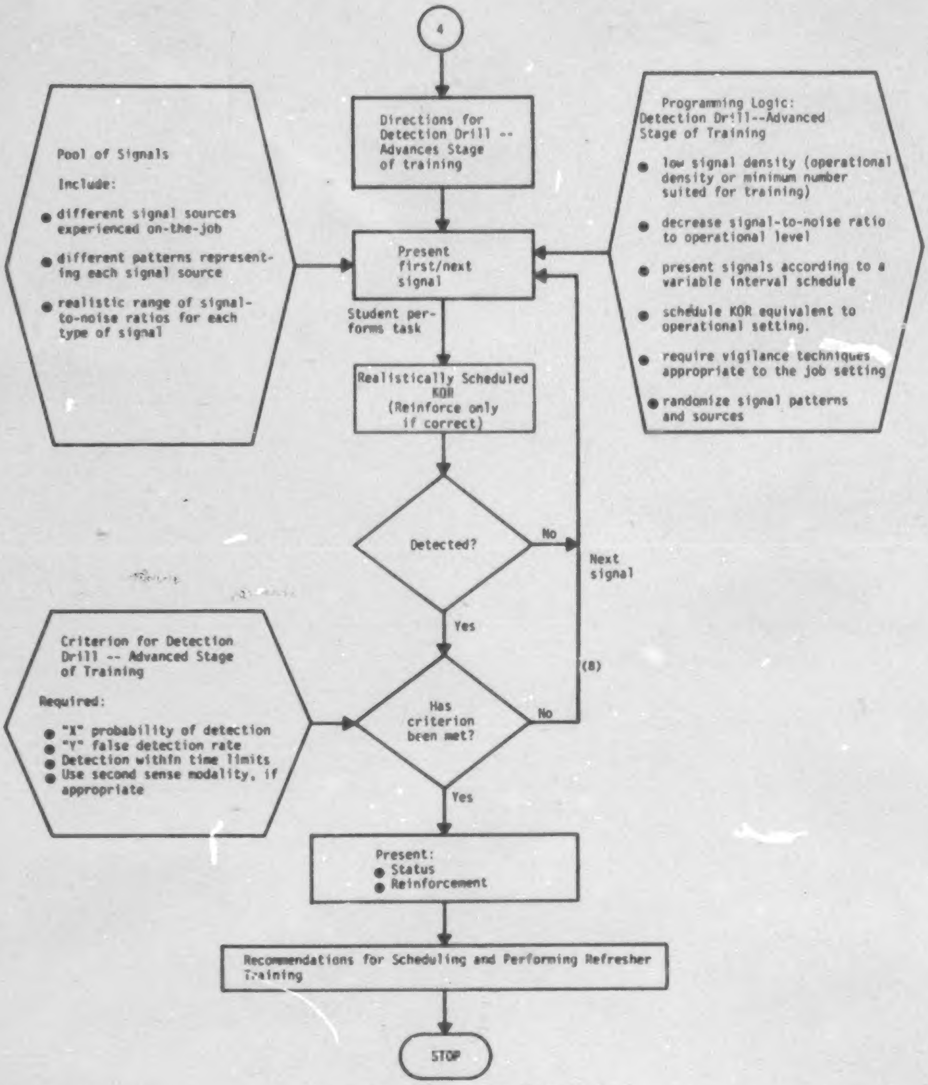
SUB-CATEGORY 4: DETECTING (Con't)


2
Introduction to vigilance training. Relate to entire training program
● Present Instructions and Model for student to use in establishing "set" to search
● Have student recall instructions and demonstrate "set" to search
Student performs task
KOR
Can student recall instructions and demonstrate "set" to search?
No
Yes
Reinforcement
● Present instructions and model for student to use in monitoring his vigilance level through biofeedback cues
● Have student recall instructions and demonstrate use of biofeedback cues
Student performs task
KOR
Can student monitor his vigilance level?
No
Yes
Reinforcement
Present Instructions and Model for student to use in scanning -- peripheral vision and eye movement --
Have student recall instructions and demonstrate efficient scan
Student performs task
KOR
Can student recall scan instructions and Demonstrate scan?
No
Yes
Reinforcement
3

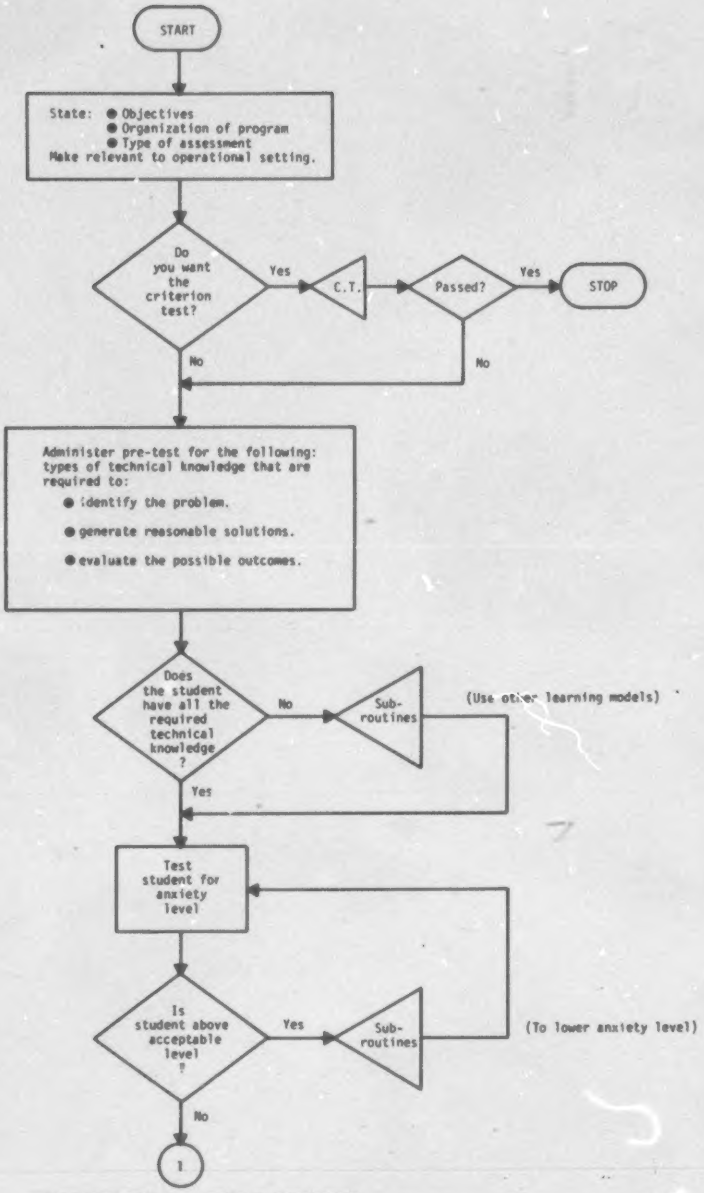
SUB-CATEGORY 4: DETECTING (Con't)


3
Directions for Detection Drill--Intermediate Stage of Training
Pool of Signals
Include:
● different signal sources experienced on-the-job
● different patterns representing each signal source
● realistic range of signal-to-noise ratios for each type of signal
Programming Logic: Detection Drill--Intermediate Stage of Training
● lower signal density
● include lower signal to noise ratios
● signals presented on a variable interval schedule
● KOR presented on a variable interval schedule
● require vigilance techniques
● mix signal patterns and sources
Present first/next signal
Student performs task
(Variable Interval) KOR (Reinforce only if correct)
Detected?
No
(8)
Next signal
Yes
Criterion for Detection Drill - Intermediate Stage of Training
Required:
● "X" probability of detection
● "Y" false detection rate
● Detection within time limits
● Use second sense modality, if appropriate
Has criterion been met?
No
Yes
● Present Student with his Status--Progress toward Objectives
● Reinforcement
4

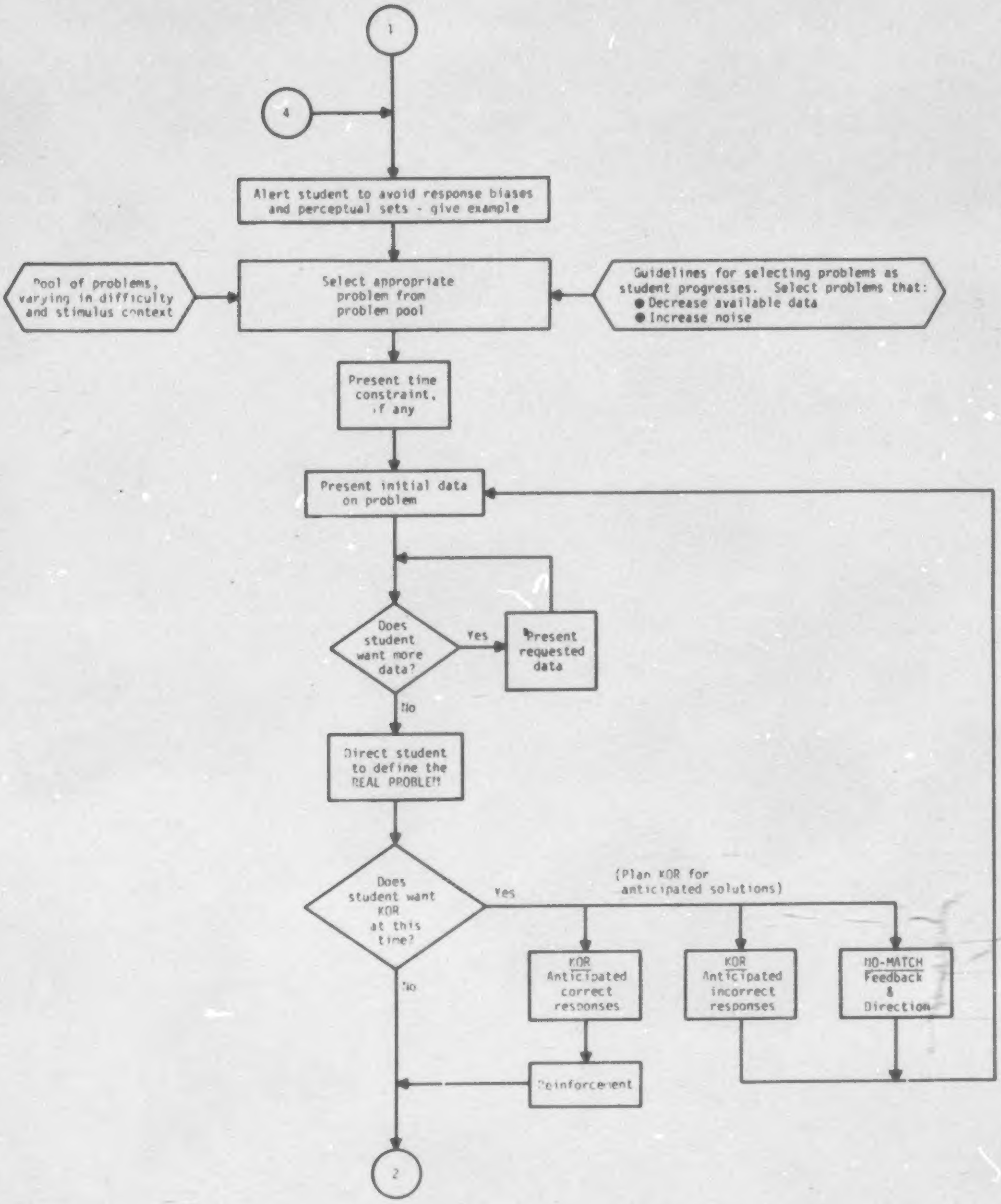
SUB-CATEGORY 4: DETECTING (Con't)


4
Directions for Detection Drill -- Advances Stage of training
Pool of Signals
Include:
● different signal sources experienced on-the-job
● different patterns representing each signal source
● realistic range of signal-to-noise ratios for each type of signal
Programming Logic: Detection Drill--Advanced Stage of Training
● low signal density (operational density or minimum number suited for training)
● decrease signal-to-noise ratio to operational level
● present signals according to a variable interval schedule
● schedule KOR equivalent to operational setting.
● require vigilance techniques appropriate to the job setting
● randomize signal patterns and sources
Present first/next signal
Student performs task
Realistically Scheduled KOR (Reinforce only if correct)
Detected?
No
Next signal
Yes
(8)
Criterion for Detection Drill -- Advanced Stage of Training
Required:
● "X" probability of detection
● "Y" false detection rate
● Detection within time limits
● Use second sense modality, if appropriate
Has criterion been met?
No
Yes
Present:
● Status
● Reinforcement
Recommendations for Scheduling and Performing Refresher Training
STOP

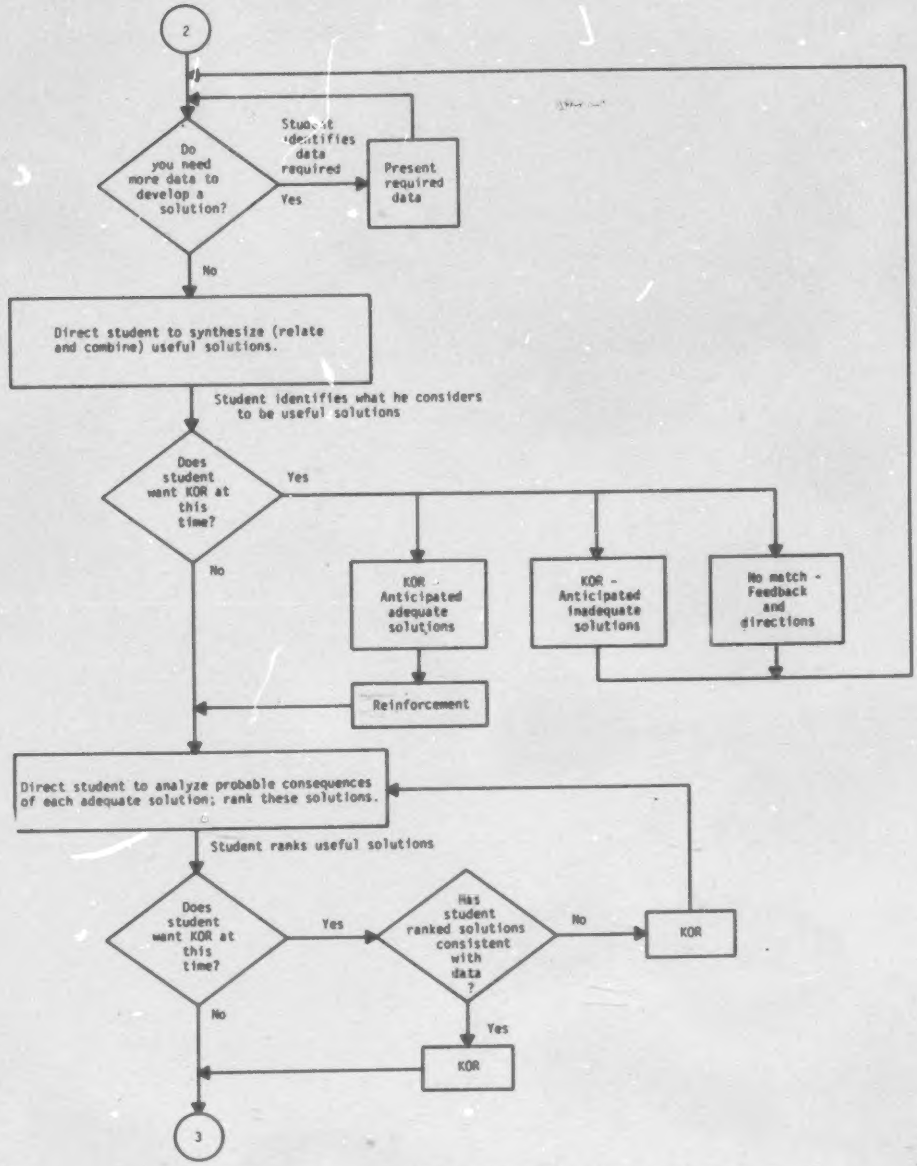
SUB-CATEGORY 4: DETECTING (Con't)


START
State: ● Objectives
● Organization of program
● Type of assessment
Make relevant to operational setting.
Do you want the criterion test?
Yes
C.T.
Passed?
Yes
STOP
No
No
Administer pre-test for the following: types of technical knowledge that are required to:
● identify the problem.
● generate reasonable solutions.
● evaluate the possible outcomes.
Does the student have all the required technical knowledge ?
No
Sub-routines
(Use other learning models)
Yes
Test student for anxiety level
Is student above acceptable level ?
Yes
Sub-routines
(To lower anxiety level)
No
1

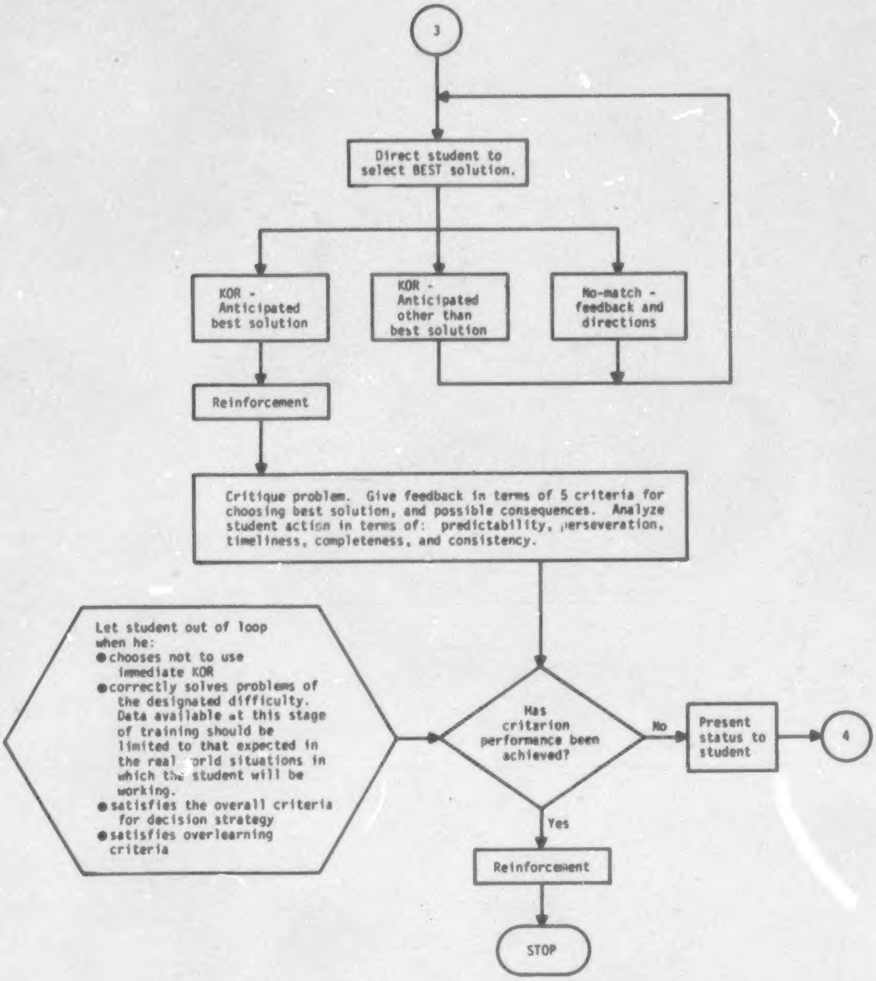
SUB-CATEGORY 5: MAKING DECISIONS


1
4
Alert student to avoid response biases and perceptual sets - give example
Pool of problems, varying in difficulty and stimulus context
Select appropriate problem from problem pool
Guidelines for selecting problems as student progresses. Select problems that:
● Decrease available data
● Increase noise
Present time constraint, if any
Present initial data on problem
Does student want more data?
Yes
Present requested data
No
Direct student to define the REAL PROBLEM
Does student want KOR at this time?
Yes
(Plan KOR for anticipated solutions)
KOR Anticipated correct responses
KOR Anticipated incorrect responses
NO-MATCH Feedback & Direction
No
Reinforcement
2

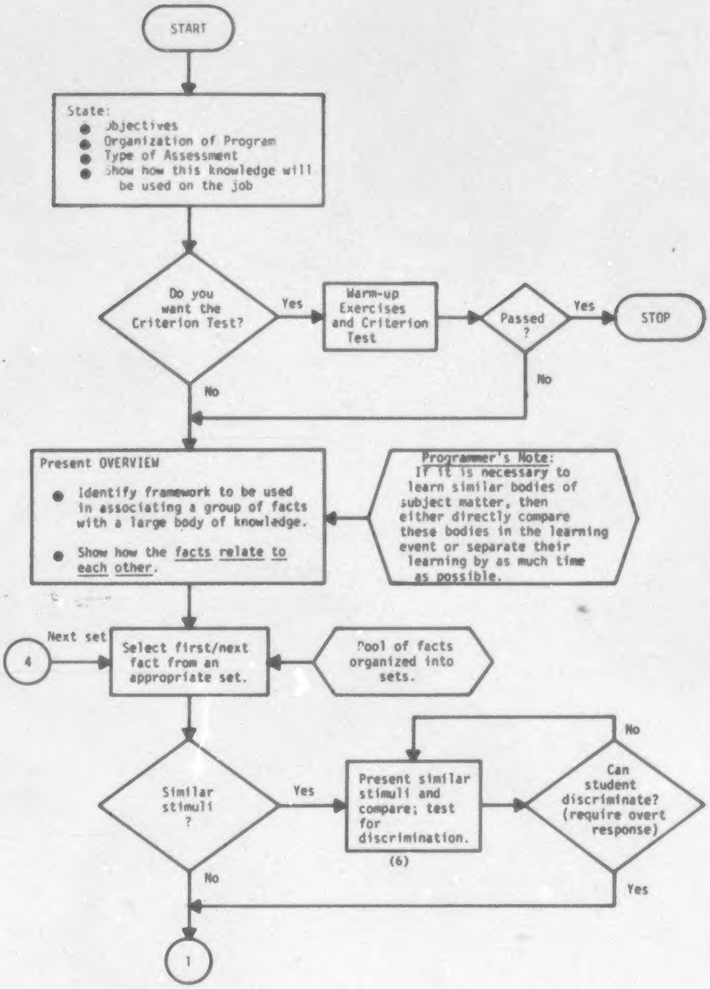
SUB-CATEGORY 5: MAKING DECISIONS (Con't)


2
Do you need more data to develop a solution?
Student identifies data required
Yes
Present required data
No
Direct student to synthesize (relate and combine) useful solutions.
Student identifies what he considers to be useful solutions
Does student want KOR at this time?
Yes
No
KOR - Anticipated adequate solutions
KOR - Anticipated inadequate solutions
No match - Feedback and directions
Reinforcement
Direct student to analyze probable consequences of each adequate solution; rank these solutions.
Student ranks useful solutions
Does student want KOR at this time?
Yes
Has student ranked solutions consistent with data ?
No
KOR
No
Yes
KOR
3

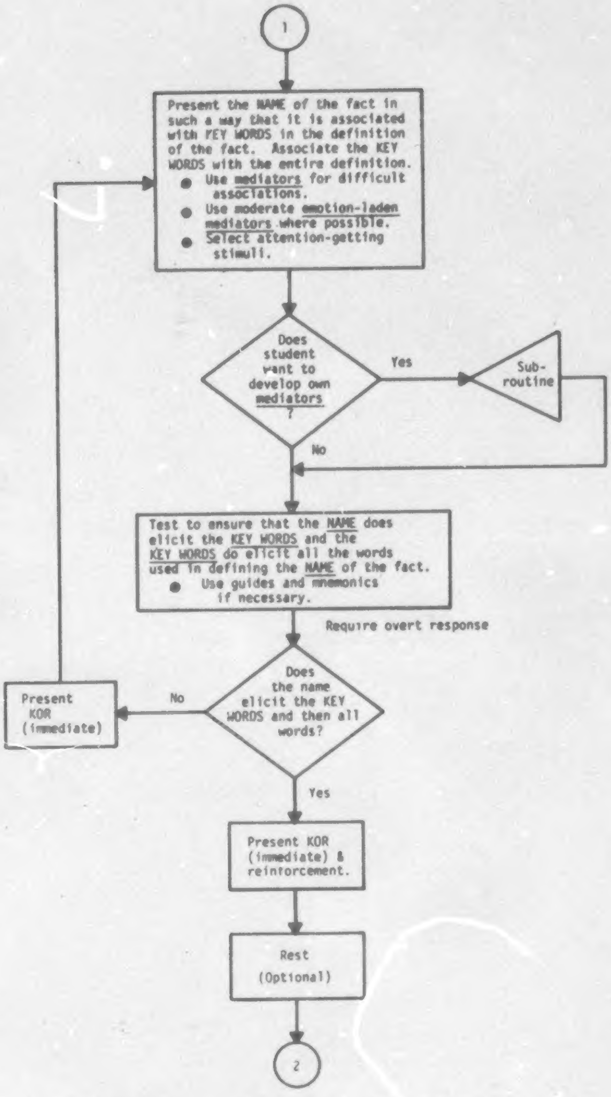
SUB-CATEGORY 5: MAKING DECISIONS (Con't)


3
Direct student to select BEST solution.
KOR - Anticipated best solution
KOR - Anticipated other than best solution
No-match - feedback and directions
Reinforcement
Critique problem. Give feedback in terms of 5 criteria for choosing best solution, and possible consequences. Analyze student action in terms of: predictability, perseveration, timeliness, completeness, and consistency.
Let student out of loop when he:
● chooses not to use immediate KOR
● correctly solves problems of the designated difficulty. Data available at this stage of training should be limited to that expected in the real world situations in which the student will be working.
● satisfies the overall criteria for decision strategy
● satisfies overlearning criteria
Has criterion performance been achieved?
No
Present status to student
4
Yes
Reinforcement
STOP

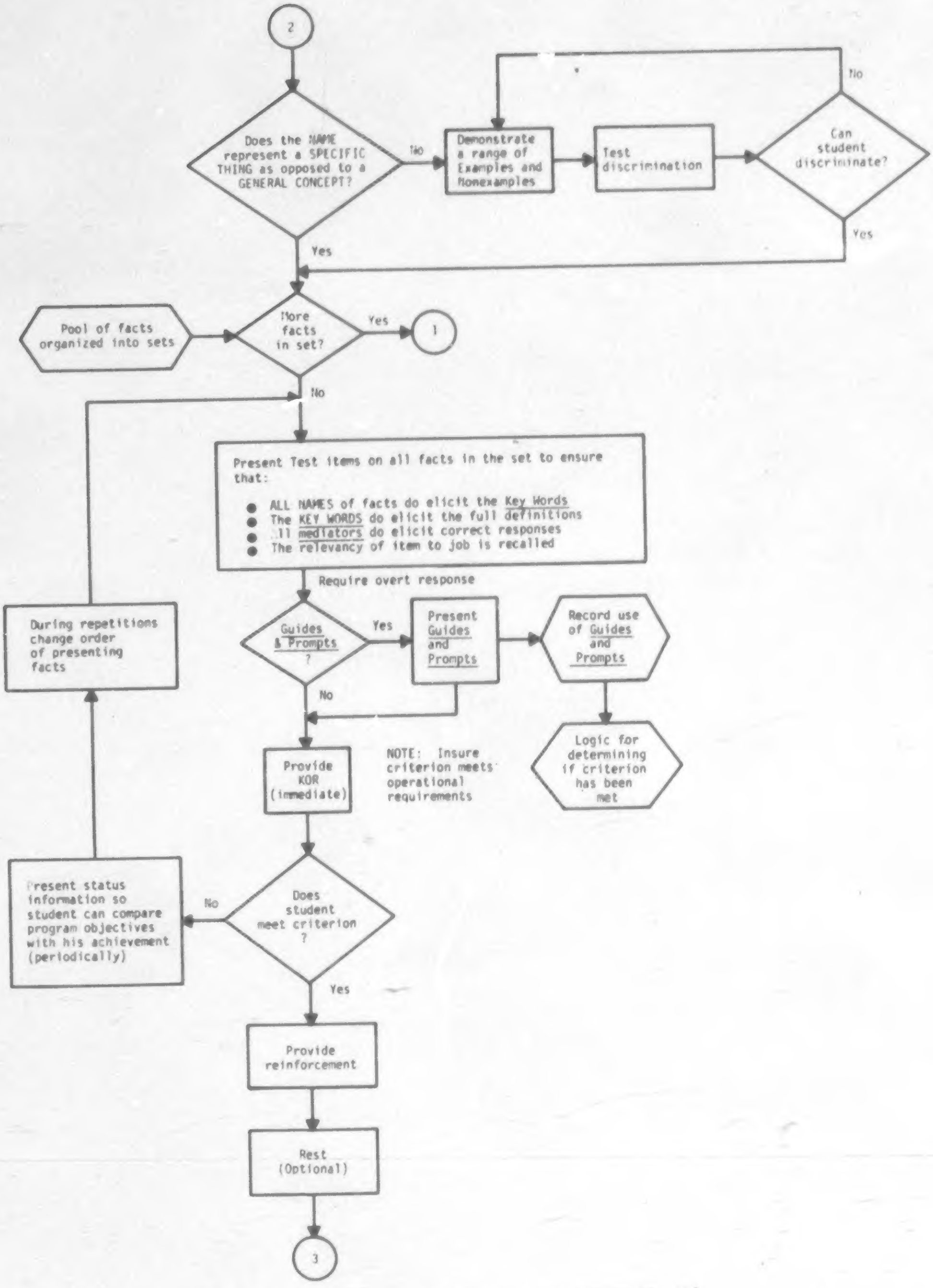
SUB-CATEGORY 5: MAKING DECISIONS (Con't)


START
State:
Objectives
Organization of Program
Type of Assessment
Show how this knowledge will be used on the job
Do you want the Criterion Test?
Yes
Warm-up Exercises and Criterion Test
Passed ?
Yes
STOP
No
No
Present OVERVIEW
Identify framework to be used in associating a group of facts with a large body of knowledge.
Show how the facts relate to each other.
Programmer's Note:
If it is necessary to learn similar bodies of subject matter, then either directly compare these bodies in the learning event or separate their learning by as much time as possible.
Next set
4
Select first/next fact from an appropriate set.
Pool of facts organized into sets.
Similar stimuli ?
Yes
Present similar stimuli and compare; test for discrimination.
(6)
Can student discriminate? (require overt response)
No
Yes
No
1

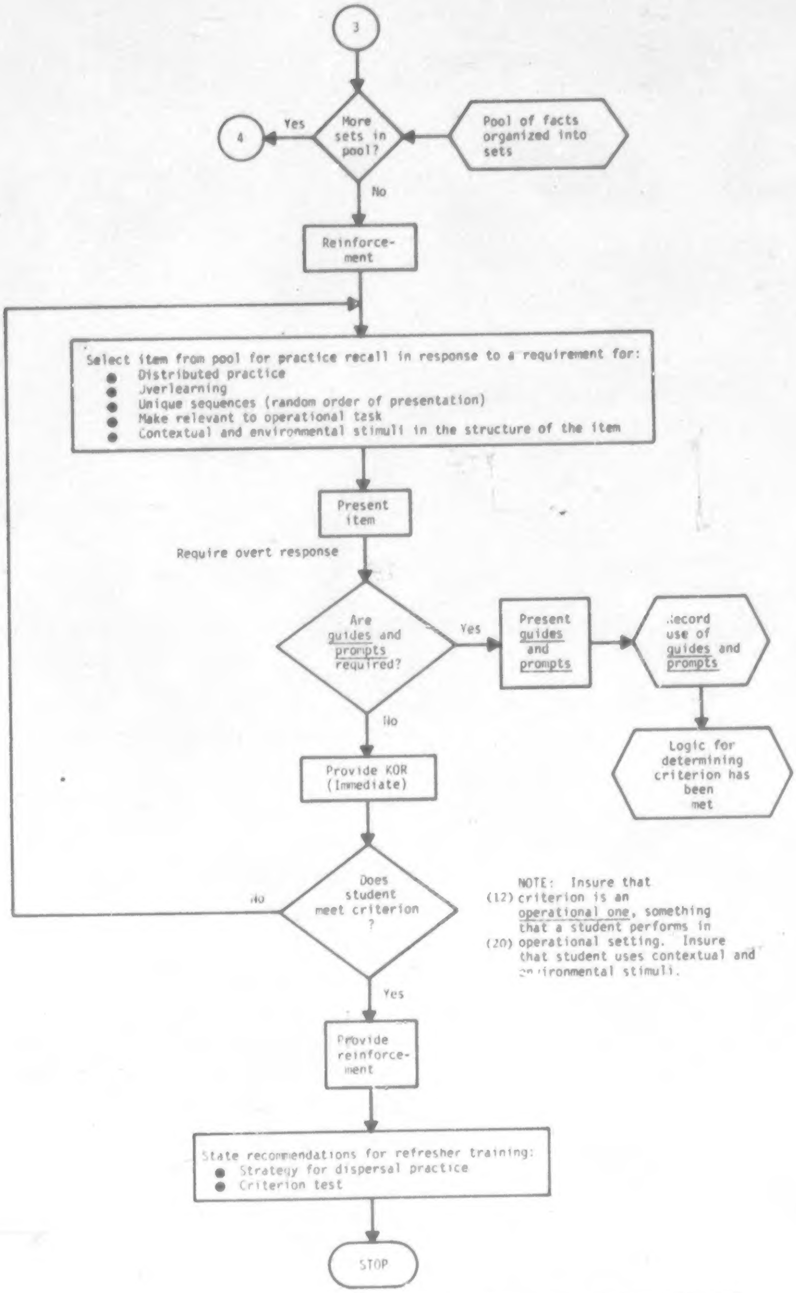
SUB-CATEGORY 6: RECALLING BODIES OF KNOWLEDGE


1
Present the NAME of the fact in such a way that it is associated with KEY WORDS in the definition of the fact. Associate the KEY WORDS with the entire definition.
● Use mediators for difficult associations.
● Use moderate emotion-laden mediators where possible.
● Select attention-getting stimuli.
Does student want to develop own mediators?
Yes
Sub-routine
No
Test to ensure that the NAME does elicit the KEY WORDS and the KEY WORDS do elicit all the words used in defining the NAME of the fact.
● Use guides and mnemonics if necessary.
Require overt response
Does the name elicit the KEY WORDS and then all words?
No
Present KOR (immediate)
Yes
Present KOR (immediate) & reinforcement.
Rest
(Optional)
2

SUB-CATEGORY 6: RECALLING BODIES OF KNOWLEDGE (Con t)

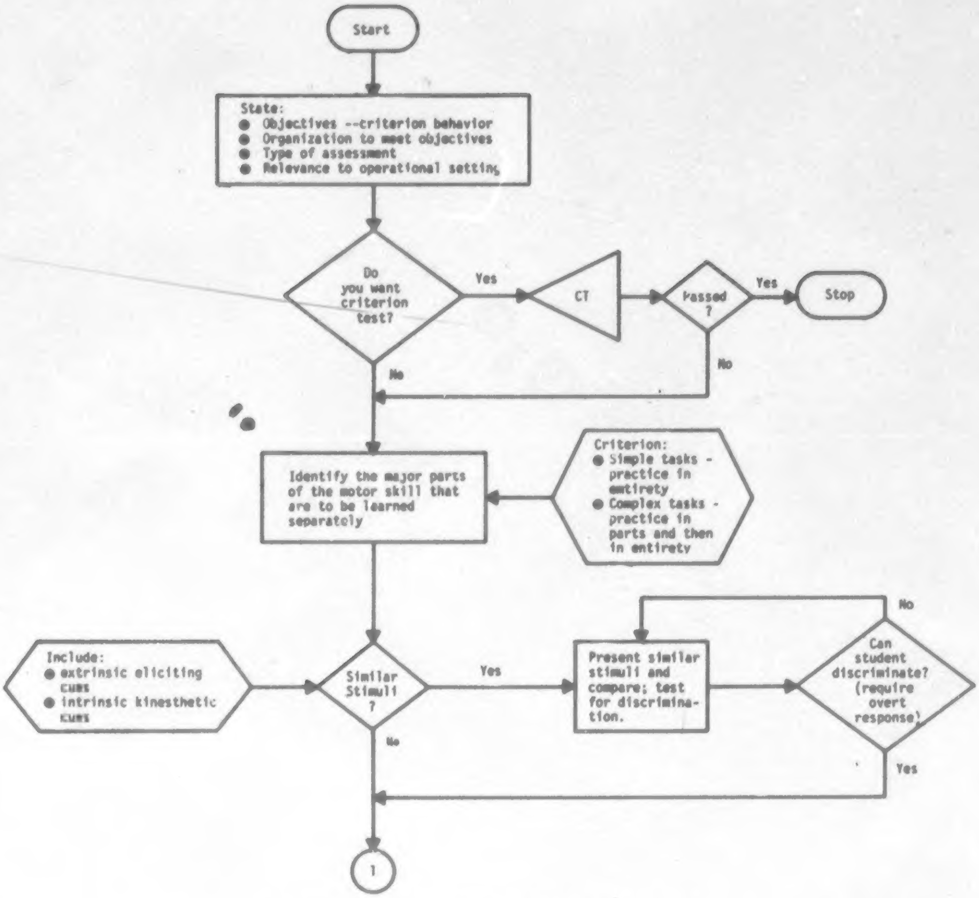

2
Does the NAME represent a SPECIFIC THING as opposed to a GENERAL CONCEPT?
No
Demonstrate a range of Examples and Nonexamples
Test discrimination
Can student discriminate?
No
Yes
Yes
Pool of facts organized into sets
More facts in set?
Yes
1
No
Present Test items on all facts in the set to ensure that:
ALL NAMES of facts do elicit the Key Words
The KEY WORDS do elicit the full definitions
All mediators do elicit correct responses
The relevancy of item to job is recalled
Require overt response
Guides & Prompts ?
Yes
Present Guides and Prompts
Record use of Guides and Prompts
No
Logic for determining if criterion has been met
Provide KOR (immediate)
NOTE: Insure criterion meets operational requirements
During repetitions change order of presenting facts
Present status information so student can compare program objectives with his achievement (periodically)
No
Does student meet criterion ?
Yes
Provide reinforcement
Rest (Optional)
3

SUB-CATEGORY 6: RECALLING BODIES OF KNOWLEDGE (Con't)

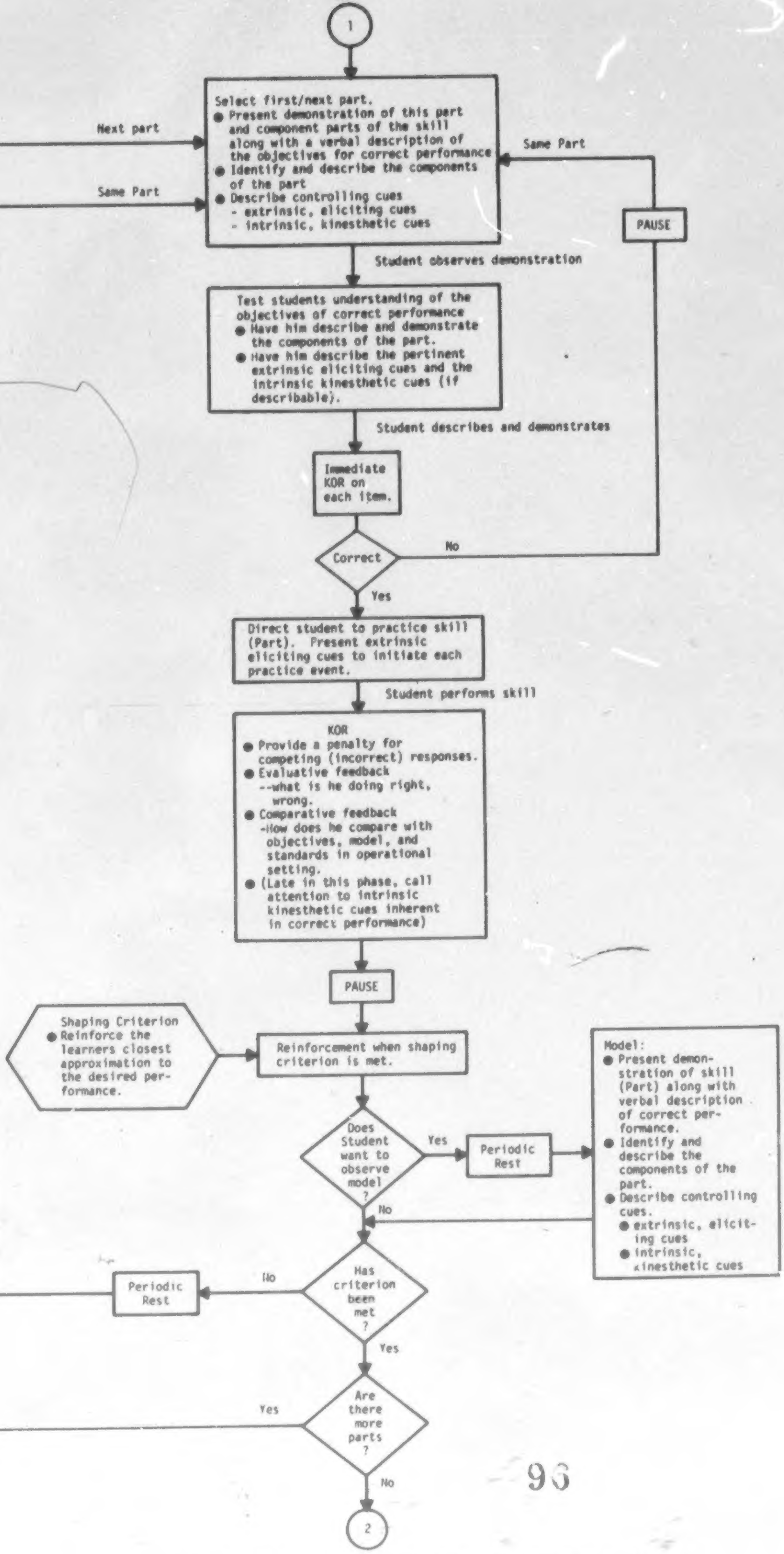

3
More sets in pool?
Yes
4
Pool of facts organized into sets
No
Reinforcement
Select item from pool for practice recall in response to a requirement for:
● Distributed practice
● Overlearning
● Unique sequences (random order of presentation)
● Make relevant to operational task
● Contextual and environmental stimuli in the structure of the item
Present item
Require overt response
Are guides and prompts required?
Yes
Present guides and prompts
Record use of guides and prompts
Logic for determining criterion has been met
No
Provide KOR (Immediate)
Does student meet criterion ?
No
Yes
Provide reinforcement
State recommendations for refresher training:
● Strategy for dispersal practice
● Criterion test
STOP

NOTE: Insure that
(12) criterion is an
operational one, something
that a student performs in
(20) operational setting. Insure
that student uses contextual and
environmental stimuli.

SUB-CATEGORY 6: RECALLING BODIES OF KNOWLEDGE (Con't)


Start
State:
● Objectives --criterion behavior
● Organization to meet objectives
● Type of assessment
● Relevance to operational setting
Do you want criterion test?
Yes
CT
Passed ?
Yes
Stop
No
No
Identify the major parts of the motor skill that are to be learned separately
Criterion:
● Simple tasks - practice in entirety
● Complex tasks - practice in parts and then in entirety
Include:
● extrinsic eliciting cues
● intrinsic kinesthetic cues
Similar Stimuli ?
Yes
Present similar stimuli and compare; test for discrimination.
Can student discriminate? (require overt response)
No
Yes
No
1

SUB-CATEGORY 7: PERFORMING GROSS MOTOR SKILLS


1
Next part
Same Part
Same Part
PAUSE
Student observes demonstration
Student describes and demonstrates
Correct
No
Yes
Student performs skill
PAUSE
Does Student want to observe model ?
Yes
Periodic Rest
No
Has criterion been met ?
No
Periodic Rest
Yes
Are there more parts ?
Yes
No
2

Select first/next part.
- Present demonstration of this part and component parts of the skill along with a verbal description of the objectives for correct performance
- Identify and describe the components of the part
- Describe controlling cues
  - extrinsic, eliciting cues
  - intrinsic, kinesthetic cues

Test students understanding of the objectives of correct performance
- Have him describe and demonstrate the components of the part.
- Have him describe the pertinent extrinsic eliciting cues and the intrinsic kinesthetic cues (if describable).

Immediate KOR on each item.

Direct student to practice skill (Part). Present extrinsic eliciting cues to initiate each practice event.

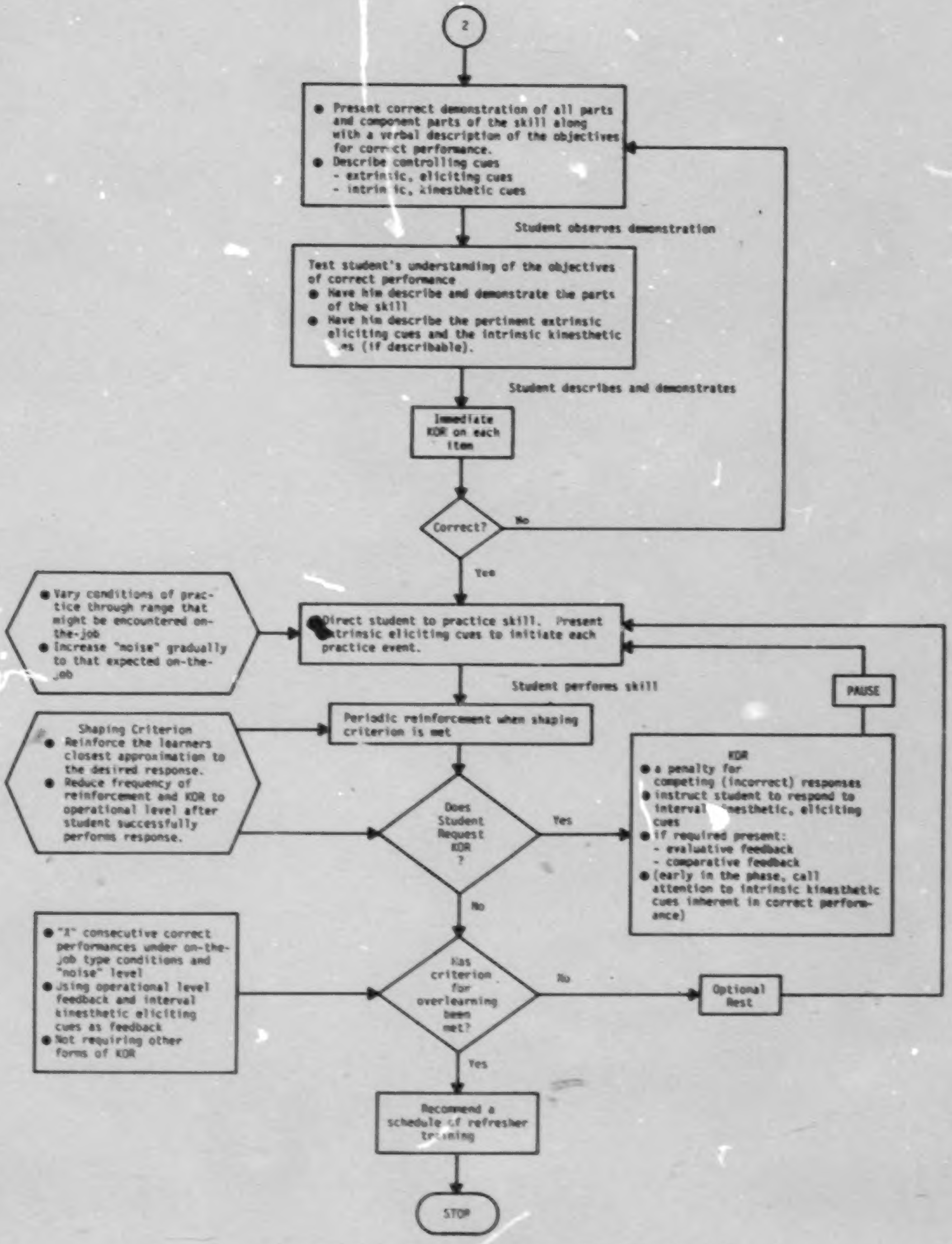
KOR
- Provide a penalty for competing (incorrect) responses.
- Evaluative feedback
  --what is he doing right, wrong.
- Comparative feedback
  -How does he compare with objectives, model, and standards in operational setting.
- (Late in this phase, call attention to intrinsic kinesthetic cues inherent in correct performance)

Shaping Criterion
- Reinforce the learners closest approximation to the desired performance.

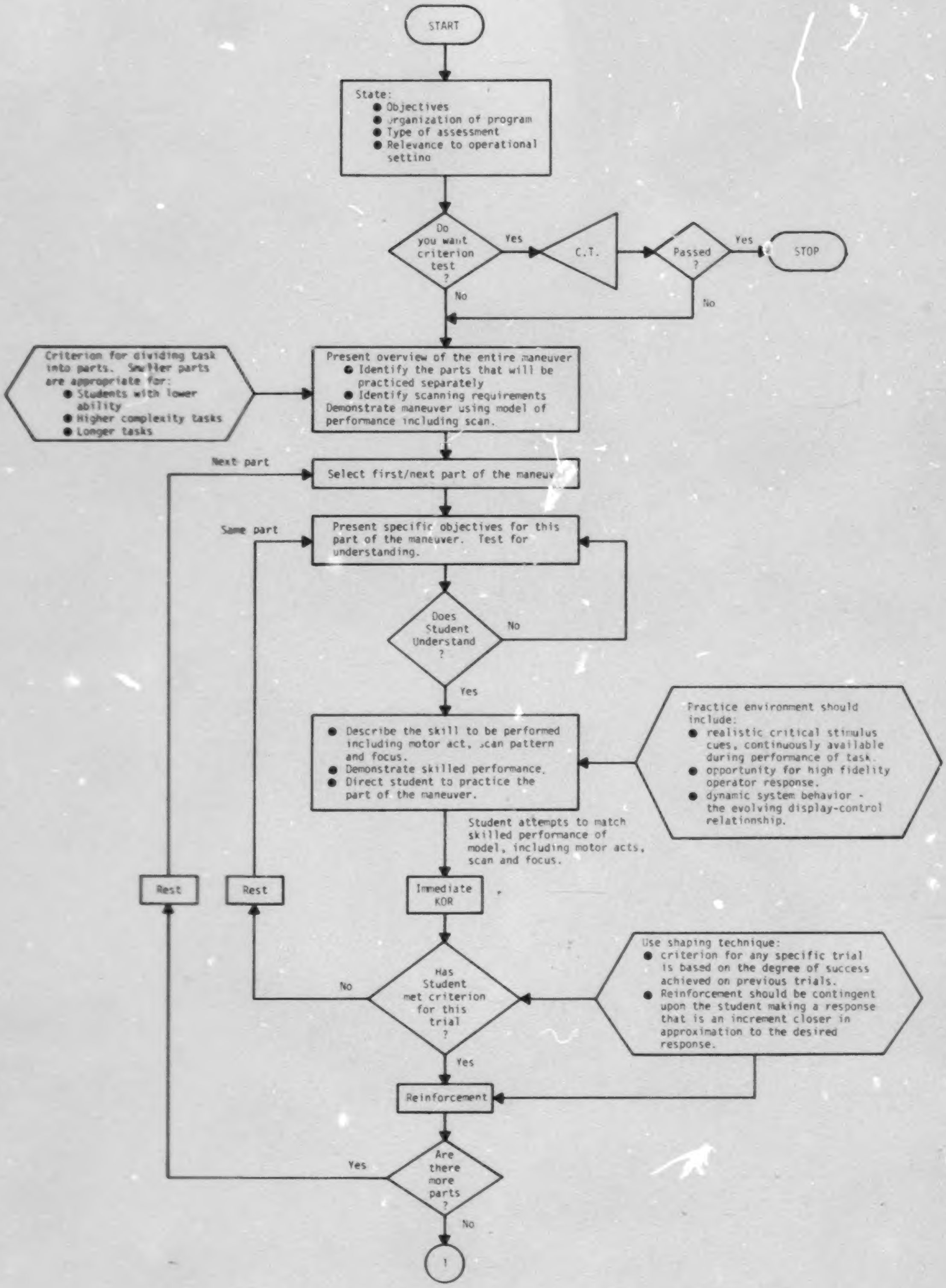
Reinforcement when shaping criterion is met.

Model:
- Present demonstration of skill (Part) along with verbal description of correct performance.
- Identify and describe the components of the part.
- Describe controlling cues.
  - extrinsic, eliciting cues
  - intrinsic, kinesthetic cues

SUB-CATEGORY 7: PERFORMING GROSS MOTOR SKILLS (Con't)


2
Present correct demonstration of all parts and component parts of the skill along with a verbal description of the objectives for correct performance.
Describe controlling cues
- extrinsic, eliciting cues
- intrinsic, kinesthetic cues
Student observes demonstration
Test student's understanding of the objectives of correct performance
Have him describe and demonstrate the parts of the skill
Have him describe the pertinent extrinsic eliciting cues and the intrinsic kinesthetic cues (if describable).
Student describes and demonstrates
Immediate KOR on each item
Correct?
No
Yes
Vary conditions of practice through range that might be encountered on-the-job
Increase "noise" gradually to that expected on-the-job
Direct student to practice skill. Present extrinsic eliciting cues to initiate each practice event.
Student performs skill
PAUSE
Shaping Criterion
Reinforce the learners closest approximation to the desired response.
Reduce frequency of reinforcement and KOR to operational level after student successfully performs response.
Periodic reinforcement when shaping criterion is met
Does Student Request KOR ?
Yes
KOR
a penalty for competing (incorrect) responses
instruct student to respond to interval kinesthetic, eliciting cues
if required present:
- evaluative feedback
- comparative feedback
(early in the phase, call attention to intrinsic kinesthetic cues inherent in correct performance)
No
"X" consecutive correct performances under on-the-job type conditions and "noise" level
Using operational level feedback and interval kinesthetic eliciting cues as feedback
Not requiring other forms of KOR
Has criterion for overlearning been met?
No
Optional Rest
Yes
Recommend a schedule of refresher training
STOP

SUB-CATEGORY 7: PERFORMING GROSS MOTOR SKILLS (Con't)


START
Do you want criterion test ?
Yes
C.T.
Passed ?
Yes
STOP
No
No
Next part
Same part
Does Student Understand ?
No
Yes
Rest
Rest
Immediate KOR
Has Student met criterion for this trial ?
No
Yes
Reinforcement
Are there more parts ?
Yes
No
1

State:
- Objectives
- Organization of program
- Type of assessment
- Relevance to operational setting

Criterion for dividing task into parts. Smaller parts are appropriate for:
- Students with lower ability
- Higher complexity tasks
- Longer tasks

Present overview of the entire maneuver
- Identify the parts that will be practiced separately
- Identify scanning requirements

Demonstrate maneuver using model of performance including scan.

Select first/next part of the maneuver

Present specific objectives for this part of the maneuver. Test for understanding.

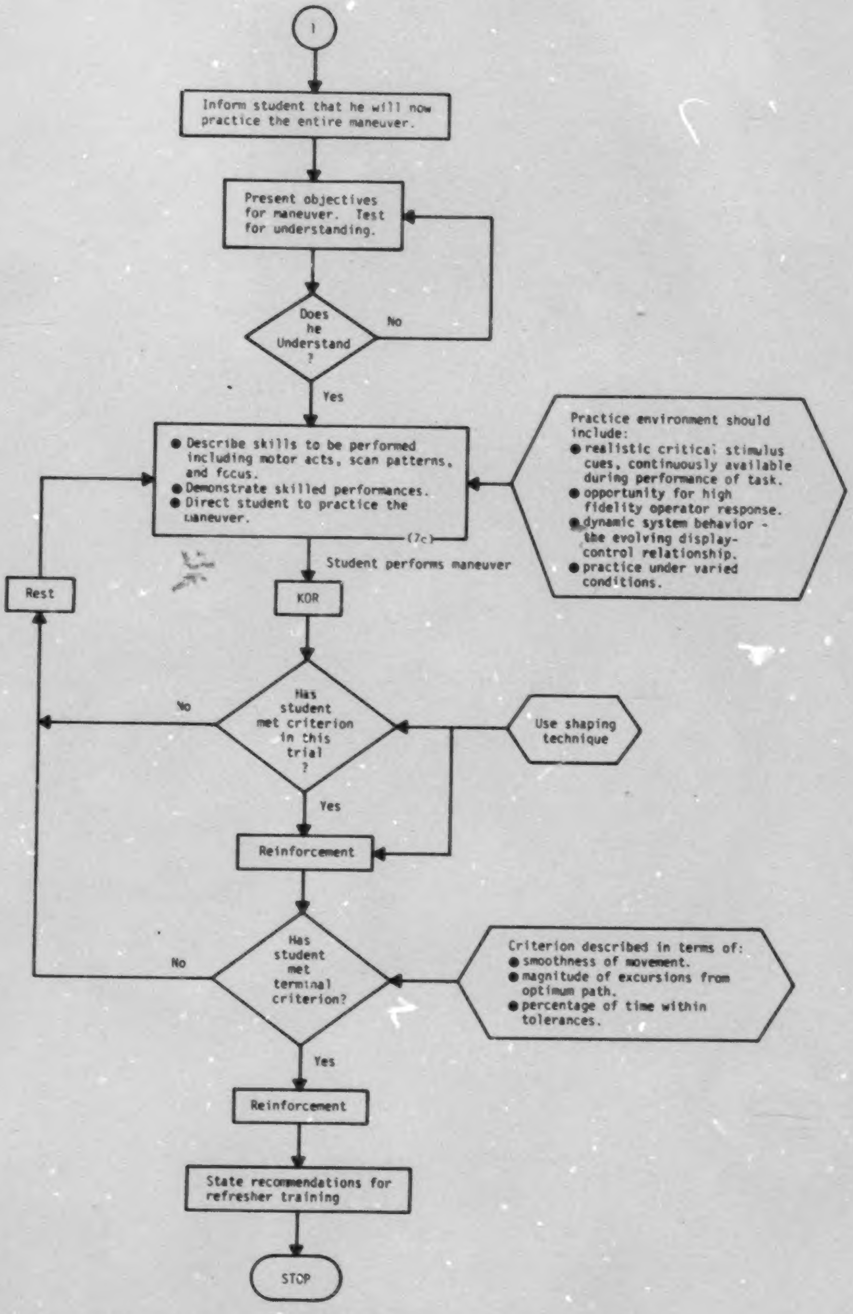
- Describe the skill to be performed including motor act, scan pattern and focus.
- Demonstrate skilled performance.
- Direct student to practice the part of the maneuver.

Practice environment should include:
- realistic critical stimulus cues, continuously available during performance of task.
- opportunity for high fidelity operator response.
- dynamic system behavior - the evolving display-control relationship.

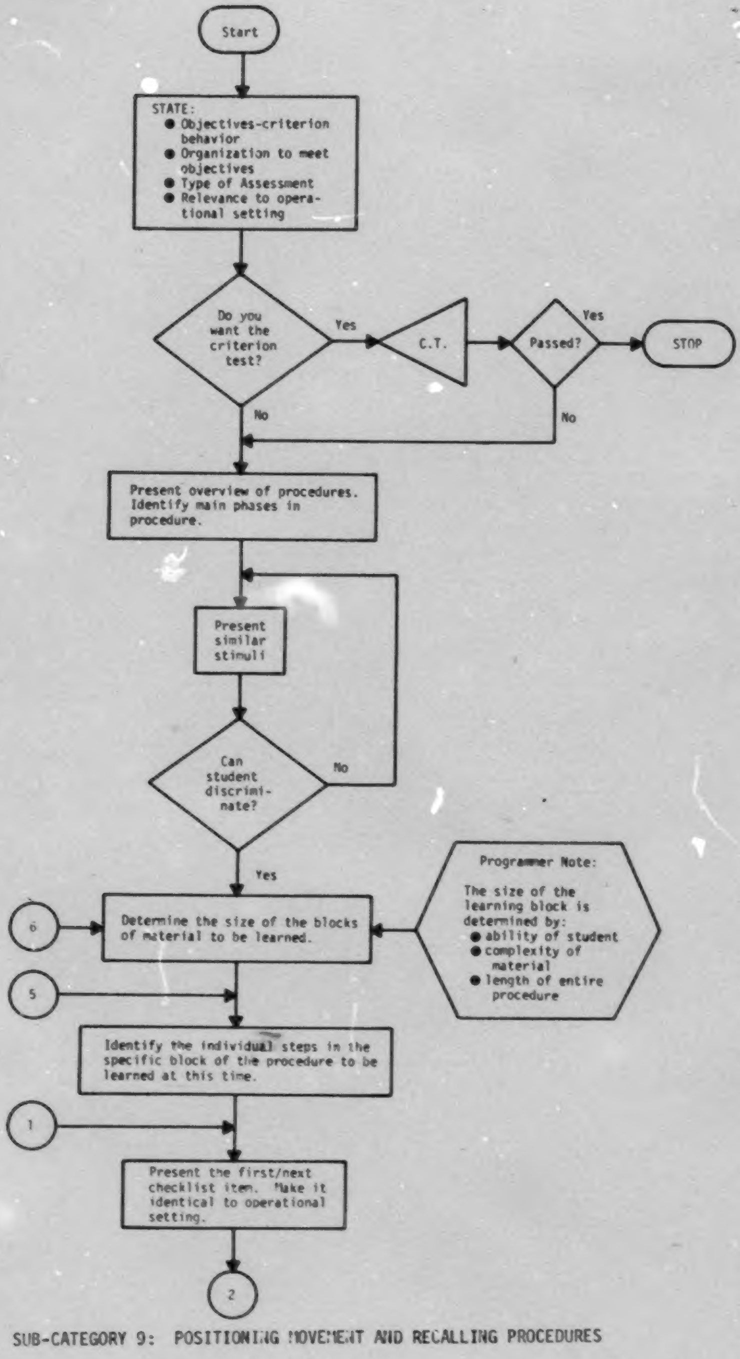
Student attempts to match skilled performance of model, including motor acts, scan and focus.

Use shaping technique:
- criterion for any specific trial is based on the degree of success achieved on previous trials.
- Reinforcement should be contingent upon the student making a response that is an increment closer in approximation to the desired response.

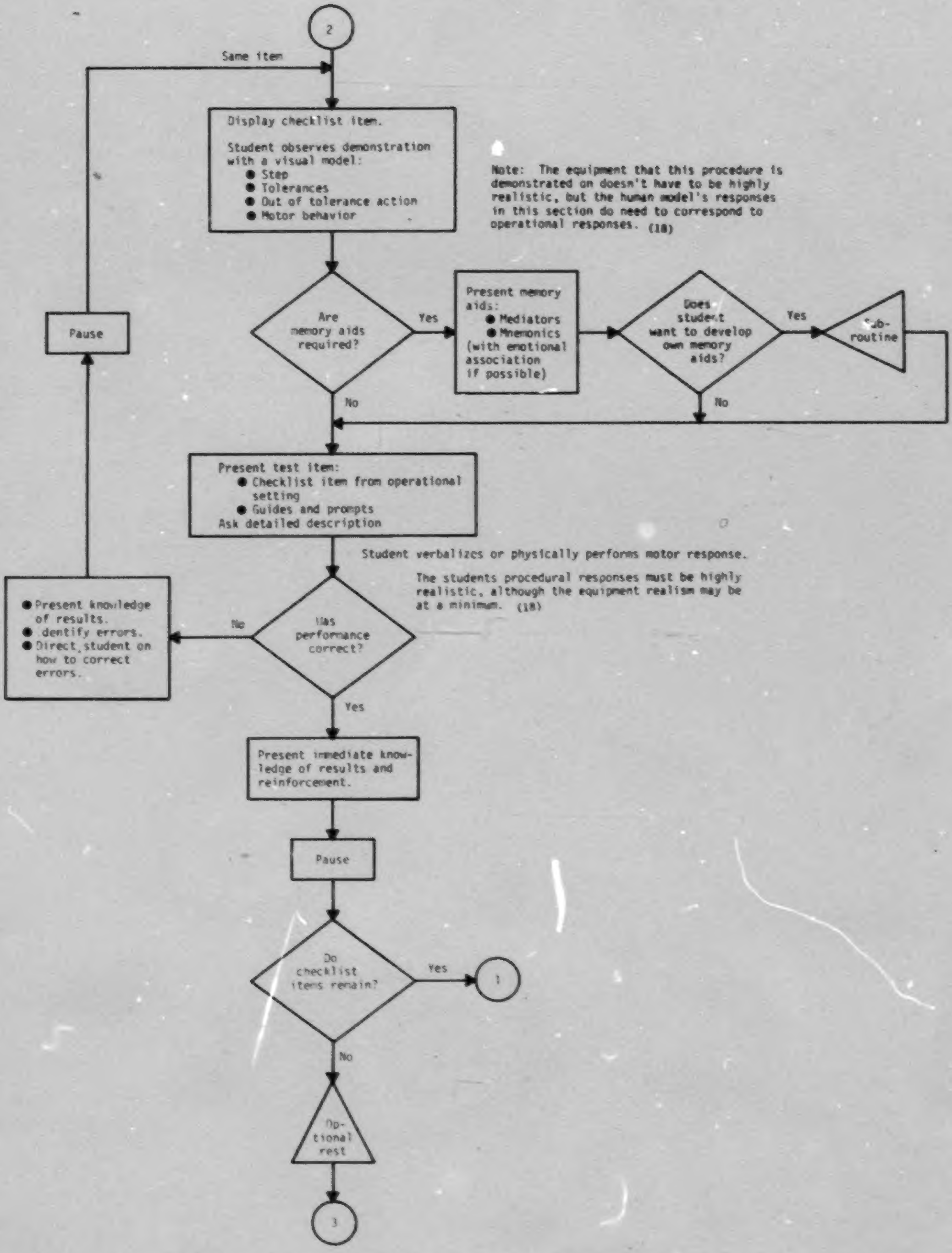
SUB-CATEGORY 8: STEERING AND GUIDING-CONTINUOUS MOVEMENT (Con't)


1
Inform student that he will now practice the entire maneuver.
Present objectives for maneuver. Test for understanding.
Does he Understand ?
No
Yes
Describe skills to be performed including motor acts, scan patterns, and focus.
Demonstrate skilled performances.
Direct student to practice the maneuver.
(7c)
Practice environment should include:
realistic critical stimulus cues, continuously available during performance of task.
opportunity for high fidelity operator response.
dynamic system behavior - the evolving display-control relationship.
practice under varied conditions.
Student performs maneuver
Rest
KOR
Has student met criterion in this trial ?
No
Yes
Use shaping technique
Reinforcement
Has student met terminal criterion?
No
Yes
Criterion described in terms of:
smoothness of movement.
magnitude of excursions from optimum path.
percentage of time within tolerances.
Reinforcement
State recommendations for refresher training
STOP

SUB-CATEGORY 8: STEERING AND GUIDING-CONTINUOUS MOVEMENT (Con't)


Start
STATE:
● Objectives-criterion behavior
● Organization to meet objectives
● Type of Assessment
● Relevance to operational setting
Do you want the criterion test?
Yes
C.T.
Passed?
Yes
STOP
No
No
Present overview of procedures. Identify main phases in procedure.
Present similar stimuli
Can student discriminate?
No
Yes
6
Determine the size of the blocks of material to be learned.
Programmer Note:
The size of the learning block is determined by:
● ability of student
● complexity of material
● length of entire procedure
5
Identify the individual steps in the specific block of the procedure to be learned at this time.
1
Present the first/next checklist item. Make it identical to operational setting.
2

SUB-CATEGORY 9: POSITIONING MOVEMENT AND RECALLING PROCEDURES

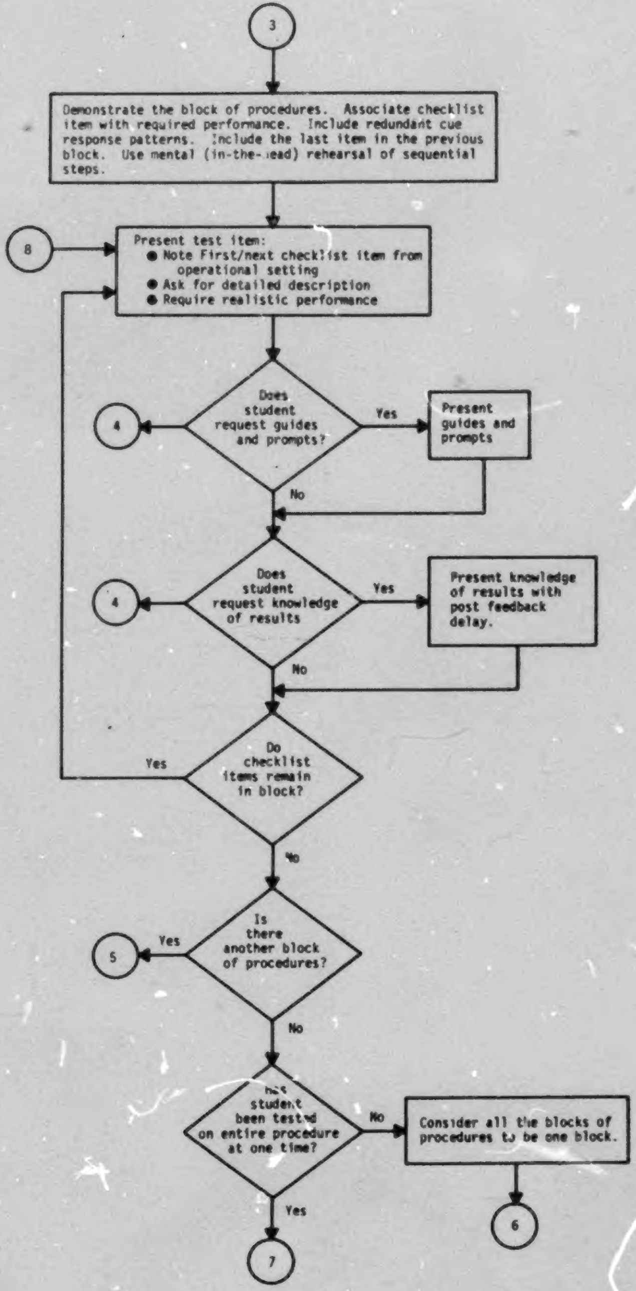

2
Same item
Display checklist item.
Student observes demonstration with a visual model:
● Step
● Tolerances
● Out of tolerance action
● Motor behavior
Pause
Are memory aids required?
Yes
No
Present memory aids:
● Mediators
● Mnemonics
(with emotional association if possible)
Does student want to develop own memory aids?
Yes
No
Sub-routine
Present test item:
● Checklist item from operational setting
● Guides and prompts
Ask detailed description
● Present knowledge of results.
● Identify errors.
● Direct student on how to correct errors.
No
Was performance correct?
Yes
Present immediate knowledge of results and reinforcement.
Pause
Do checklist items remain?
Yes
1
No
Optional rest
3

Note: The equipment that this procedure is demonstrated on doesn't have to be highly realistic, but the human model's responses in this section do need to correspond to operational responses. (18)

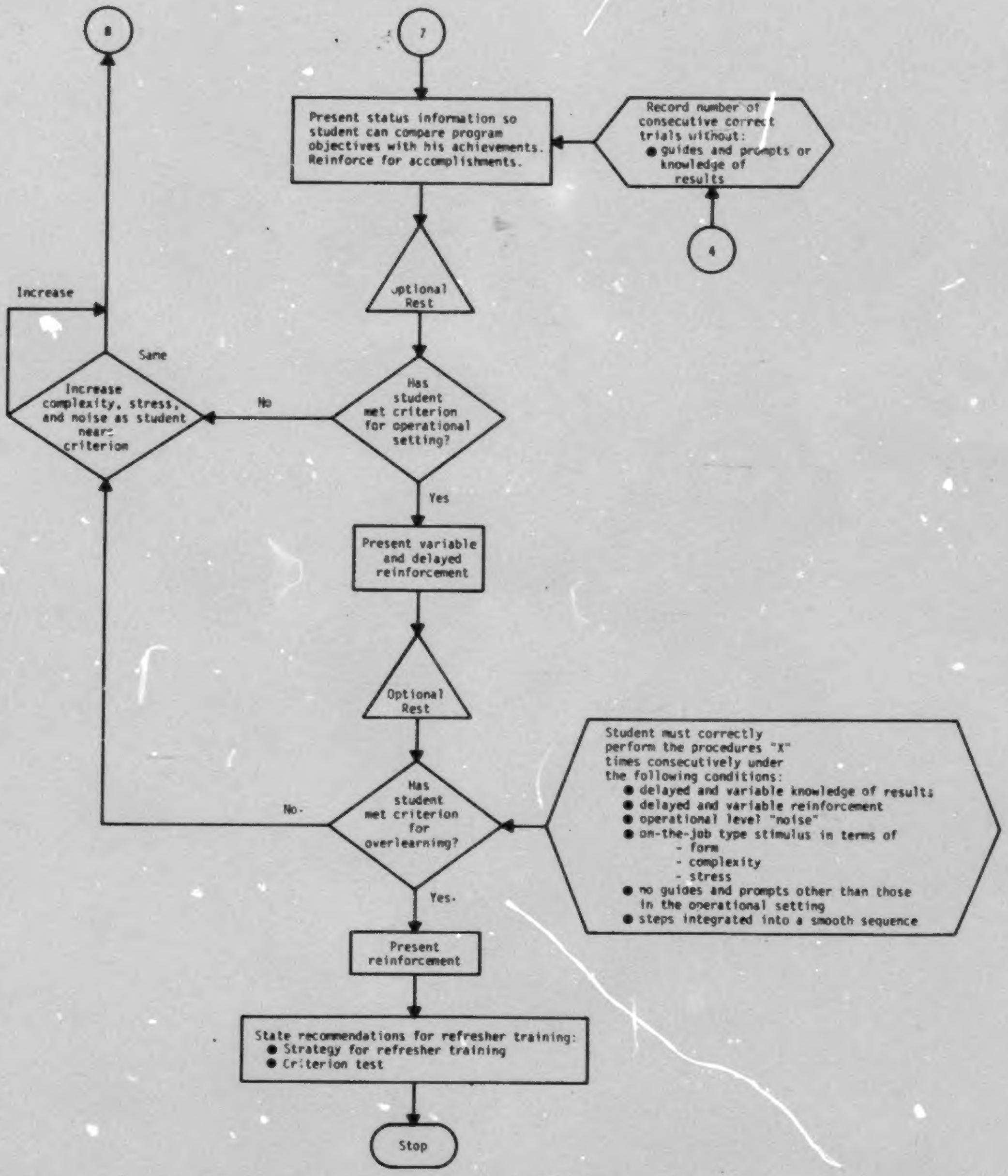
Student verbalizes or physically performs motor response.

The students procedural responses must be highly realistic, although the equipment realism may be at a minimum. (18)

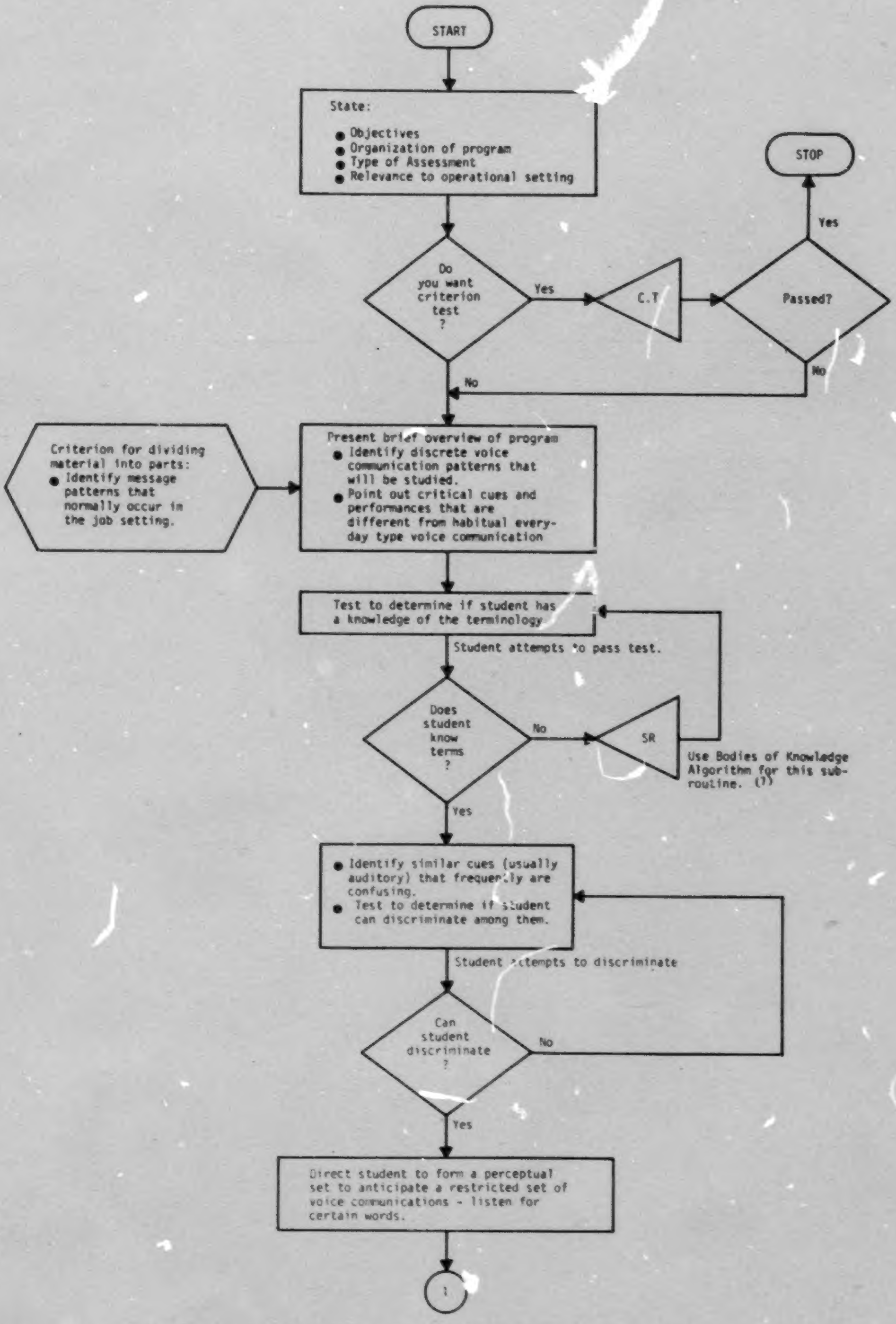
SUB-CATEGORY 9: POSITIONING MOVEMENT AND RECALLING PROCEDURES (Con't)


3
Demonstrate the block of procedures. Associate checklist item with required performance. Include redundant cue response patterns. Include the last item in the previous block. Use mental (in-the-head) rehearsal of sequential steps.
8
Present test item:
● Note First/next checklist item from operational setting
● Ask for detailed description
● Require realistic performance
Does student request guides and prompts?
Yes
Present guides and prompts
4
No
Does student request knowledge of results?
Yes
Present knowledge of results with post feedback delay.
4
No
Do checklist items remain in block?
Yes
No
Is there another block of procedures?
Yes
5
No
Has student been tested on entire procedure at one time?
No
Consider all the blocks of procedures to be one block.
6
Yes
7

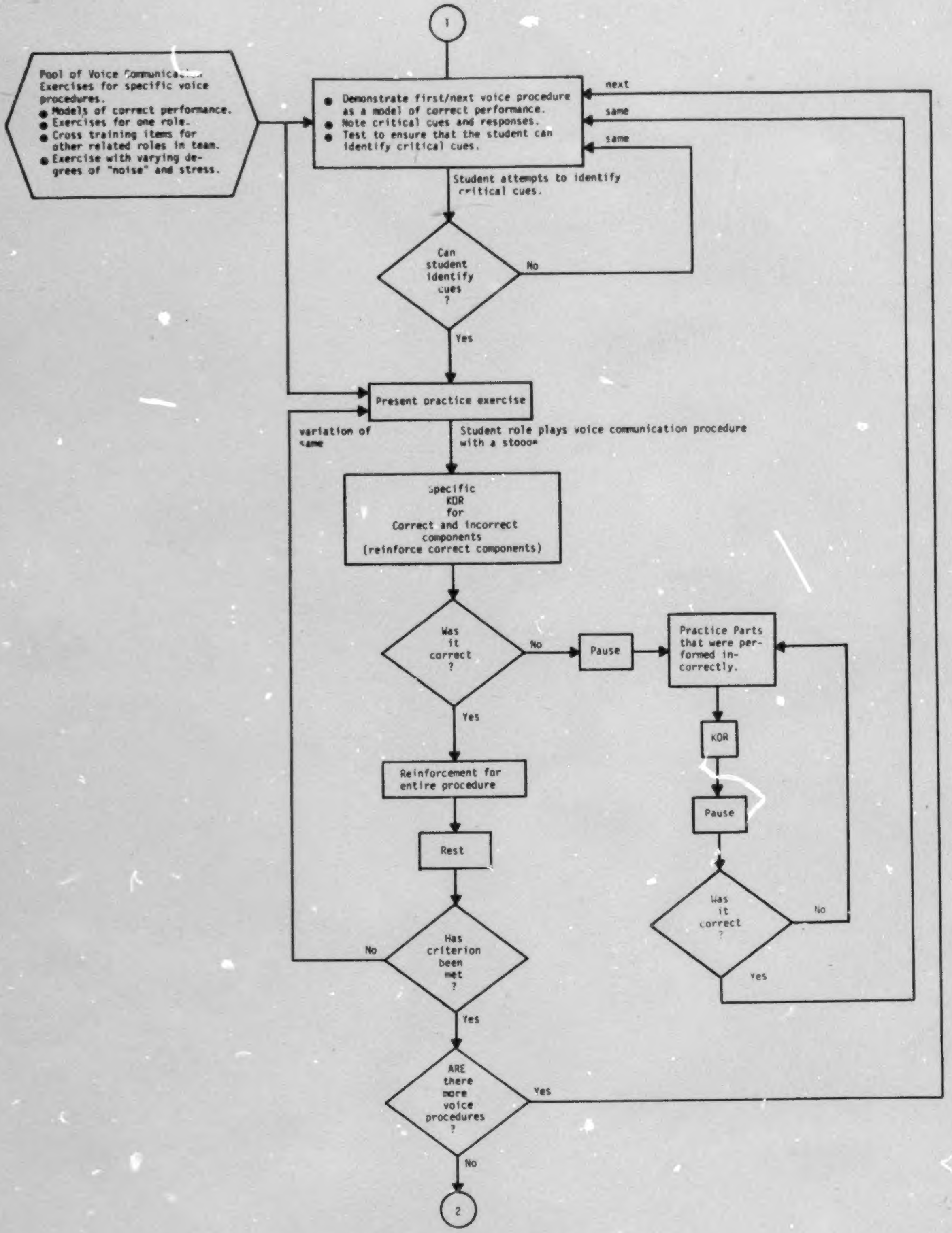
SUB-CATEGORY 9: POSITIONING MOVEMENT AND RECALLING PROCEDURES (Con't)


8
7
Present status information so student can compare program objectives with his achievements. Reinforce for accomplishments.
Record number of consecutive correct trials without:
● guides and prompts or knowledge of results
4
Optional Rest
Increase
Same
Increase complexity, stress, and noise as student nears criterion
No
Has student met criterion for operational setting?
Yes
Present variable and delayed reinforcement
Optional Rest
Student must correctly perform the procedures "X" times consecutively under the following conditions:
● delayed and variable knowledge of results
● delayed and variable reinforcement
● operational level "noise"
● on-the-job type stimulus in terms of
- form
- complexity
- stress
● no guides and prompts other than those in the operational setting
● steps integrated into a smooth sequence
No
Has student met criterion for overlearning?
Yes
Present reinforcement
State recommendations for refresher training:
● Strategy for refresher training
● Criterion test
Stop

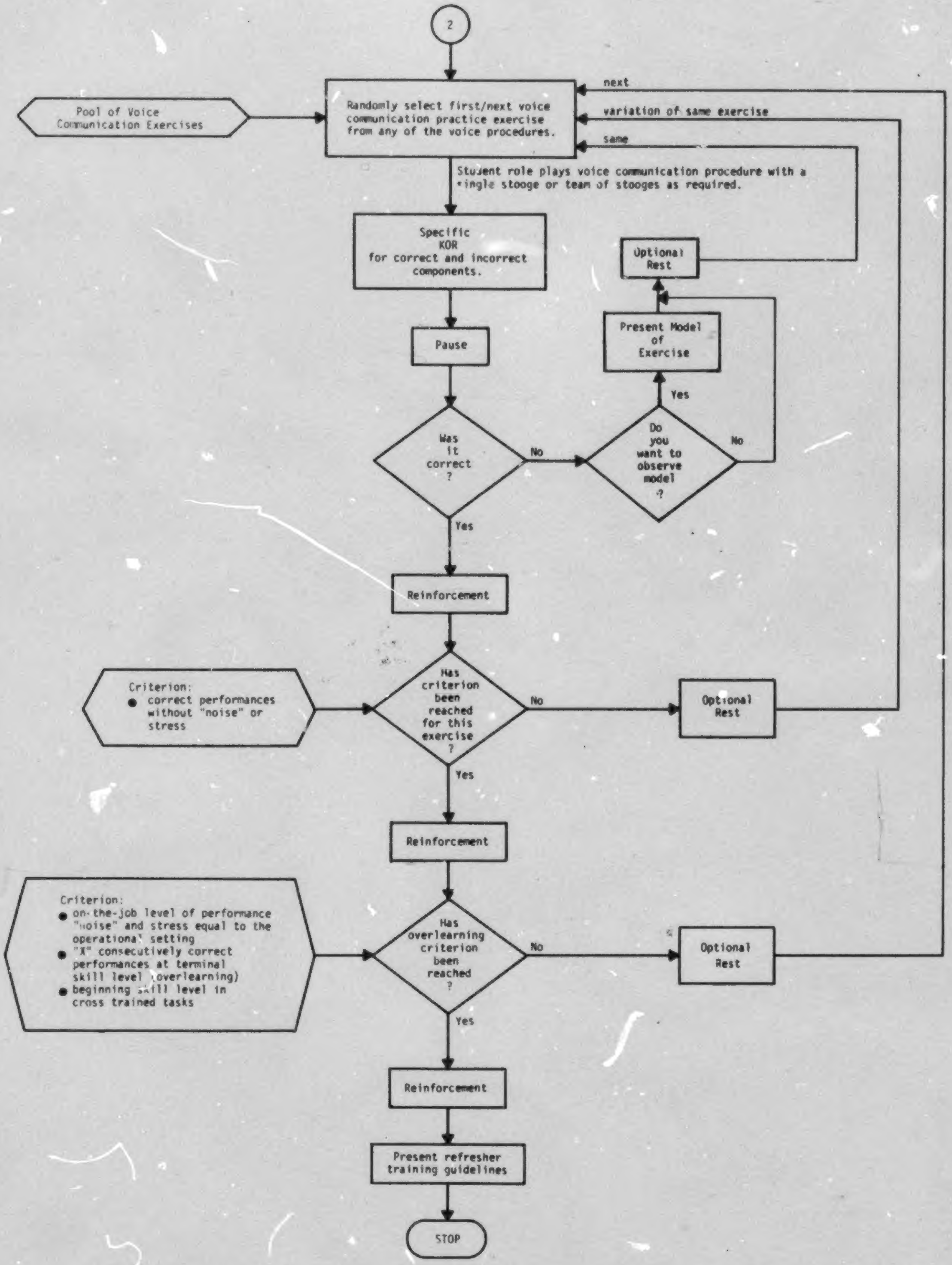
SUB-CATEGORY 9: POSITIONING MOVEMENT AND RECALLING PROCEDURES (Con't)


START
State:
Objectives
Organization of program
Type of Assessment
Relevance to operational setting
Do you want criterion test ?
Yes
C.T
Passed?
Yes
STOP
No
No
Criterion for dividing material into parts:
Identify message patterns that normally occur in the job setting.
Present brief overview of program
Identify discrete voice communication patterns that will be studied.
Point out critical cues and performances that are different from habitual every-day type voice communication
Test to determine if student has a knowledge of the terminology
Student attempts to pass test.
Does student know terms ?
No
SR
Use Bodies of Knowledge Algorithm for this subroutine. (7)
Yes
Identify similar cues (usually auditory) that frequently are confusing.
Test to determine if student can discriminate among them.
Student attempts to discriminate
Can student discriminate ?
No
Yes
Direct student to form a perceptual set to anticipate a restricted set of voice communications - listen for certain words.
1

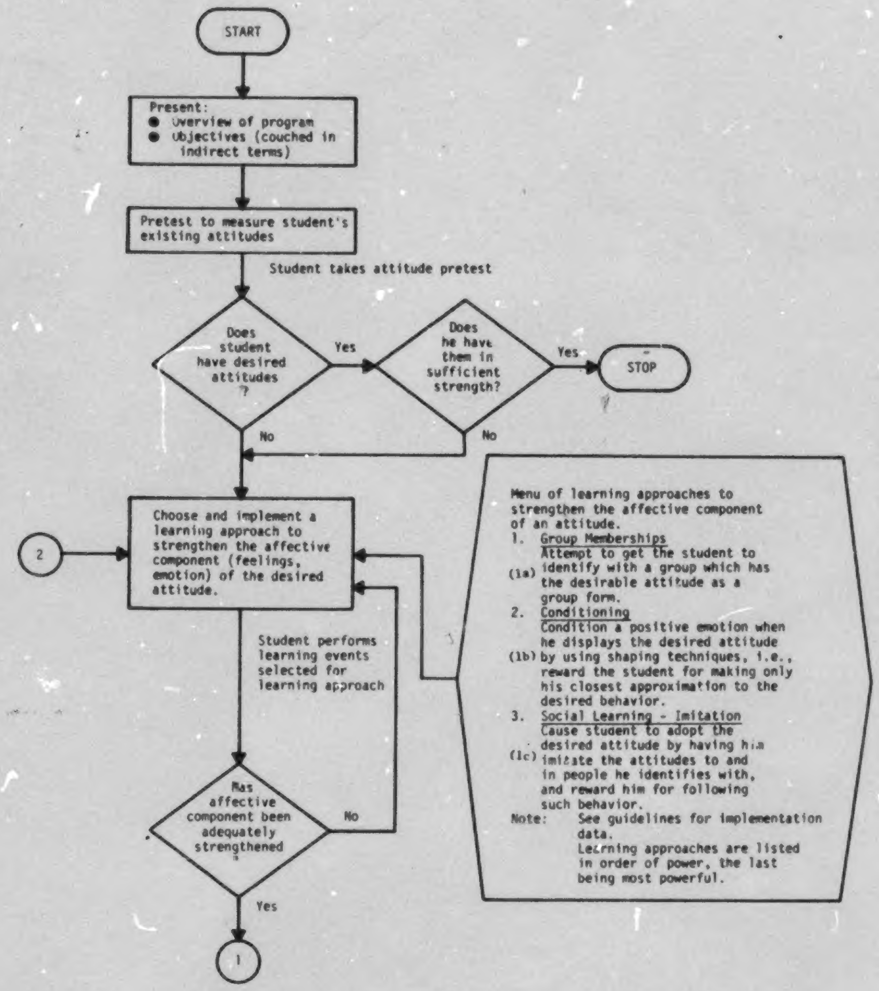
SUB-CATEGORY 10: VOICE COMMUNICATING


1
Pool of Voice Communication Exercises for specific voice procedures.
● Models of correct performance.
● Exercises for one role.
● Cross training items for other related roles in team.
● Exercise with varying degrees of "noise" and stress.
● Demonstrate first/next voice procedure as a model of correct performance.
● Note critical cues and responses.
● Test to ensure that the student can identify critical cues.
next
same
same
Student attempts to identify critical cues.
Can student identify cues ?
No
Yes
Present practice exercise
variation of same
Student role plays voice communication procedure with a stooge
Specific KOR for Correct and incorrect components (reinforce correct components)
Was it correct ?
No
Pause
Practice Parts that were performed incorrectly.
KOR
Pause
Was it correct ?
No
Yes
Yes
Reinforcement for entire procedure
Rest
Has criterion been met ?
No
Yes
ARE there more voice procedures ?
Yes
No
2

SUB-CATEGORY 10: VOICE COMMUNICATING (Con't)


2
Pool of Voice Communication Exercises
Randomly select first/next voice communication practice exercise from any of the voice procedures.
next
variation of same exercise
same
Student role plays voice communication procedure with a single stooge or team of stooges as required.
Specific KOR for correct and incorrect components.
Optional Rest
Present Model of Exercise
Pause
Yes
Was it correct ?
No
Do you want to observe model ?
No
Yes
Reinforcement
Criterion:
● correct performances without "noise" or stress
Has criterion been reached for this exercise ?
No
Optional Rest
Yes
Reinforcement
Criterion:
● on-the-job level of performance "noise" and stress equal to the operational setting
● "X" consecutively correct performances at terminal skill level (overlearning)
● beginning skill level in cross trained tasks
Has overlearning criterion been reached ?
No
Optional Rest
Yes
Reinforcement
Present refresher training guidelines
STOP

SUB-CATEGORY 10: VOICE COMMUNICATING (Con't)

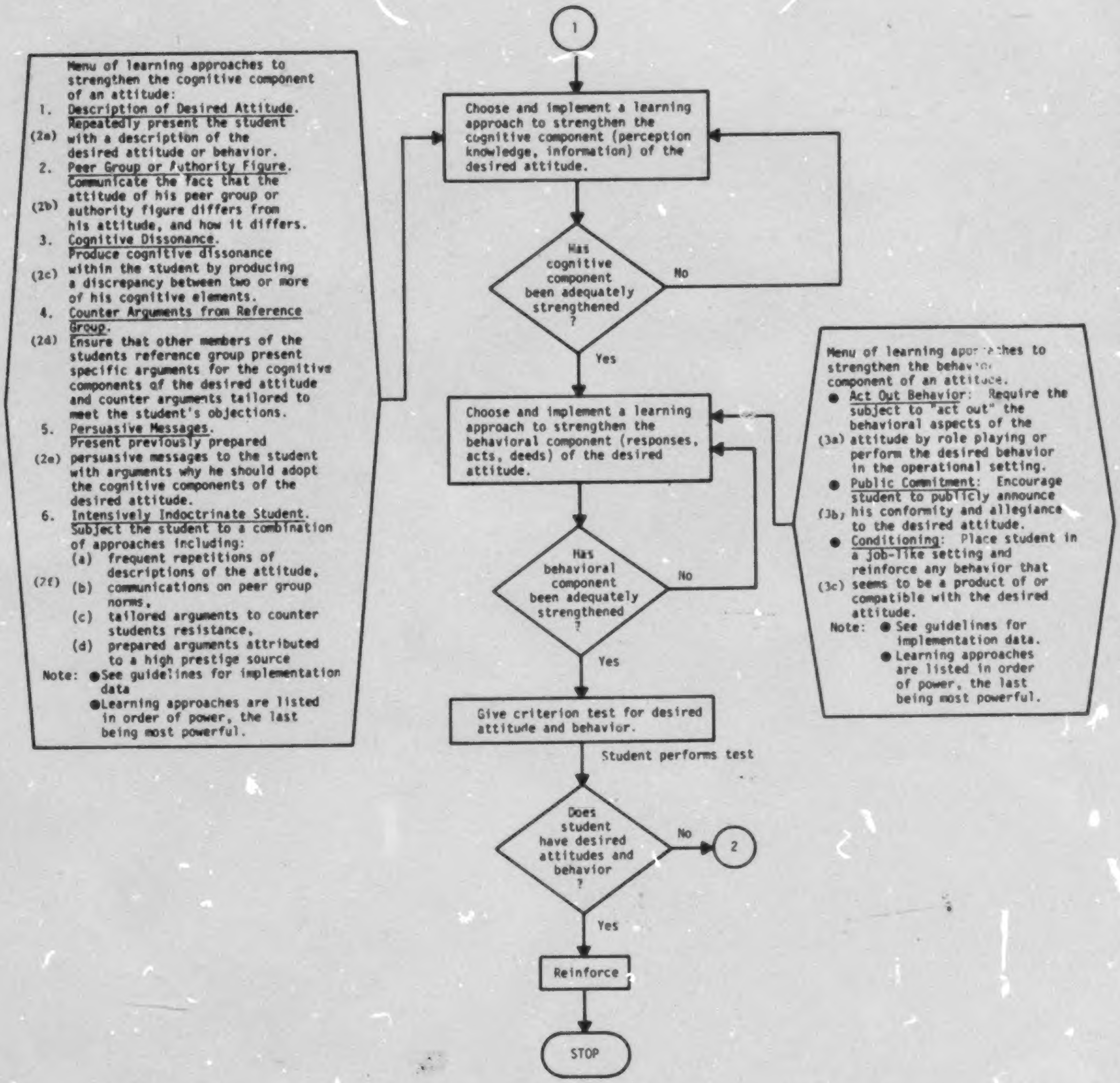

START
Present:
● Overview of program
● Objectives (couched in indirect terms)
Pretest to measure student's existing attitudes
Student takes attitude pretest
Does student have desired attitudes ?
Yes
Does he have them in sufficient strength?
Yes
STOP
No
No
2
Choose and implement a learning approach to strengthen the affective component (feelings, emotion) of the desired attitude.
Student performs learning events selected for learning approach
Has affective component been adequately strengthened ?
No
Yes
1

Menu of learning approaches to strengthen the affective component of an attitude.

1. Group Memberships
   (1a) Attempt to get the student to identify with a group which has the desirable attitude as a group form.
2. Conditioning
   (1b) Condition a positive emotion when he displays the desired attitude by using shaping techniques, i.e., reward the student for making only his closest approximation to the desired behavior.
3. Social Learning - Imitation
   (1c) Cause student to adopt the desired attitude by having him imitate the attitudes to and in people he identifies with, and reward him for following such behavior.

Note: See guidelines for implementation data.
Learning approaches are listed in order of power, the last being most powerful.

SUB-CATEGORY 11: ATTITUDE LEARNING


1
Choose and implement a learning approach to strengthen the cognitive component (perception knowledge, information) of the desired attitude.
Has cognitive component been adequately strengthened ?
No
Yes
Choose and implement a learning approach to strengthen the behavioral component (responses, acts, deeds) of the desired attitude.
Has behavioral component been adequately strengthened ?
No
Yes
Give criterion test for desired attitude and behavior.
Student performs test
Does student have desired attitudes and behavior ?
No
2
Yes
Reinforce
STOP

Menu of learning approaches to strengthen the cognitive component of an attitude:

1. Description of Desired Attitude.
   (2a) Repeatedly present the student with a description of the desired attitude or behavior.
2. Peer Group or Authority Figure.
   (2b) Communicate the fact that the attitude of his peer group or authority figure differs from his attitude, and how it differs.
3. Cognitive Dissonance.
   (2c) Produce cognitive dissonance within the student by producing a discrepancy between two or more of his cognitive elements.
4. Counter Arguments from Reference Group.
   (2d) Ensure that other members of the students reference group present specific arguments for the cognitive components of the desired attitude and counter arguments tailored to meet the student's objections.
5. Persuasive Messages.
   (2e) Present previously prepared persuasive messages to the student with arguments why he should adopt the cognitive components of the desired attitude.
6. Intensively Indoctrinate Student.
   (2f) Subject the student to a combination of approaches including:
   (a) frequent repetitions of descriptions of the attitude,
   (b) communications on peer group norms,
   (c) tailored arguments to counter students resistance,
   (d) prepared arguments attributed to a high prestige source

Note:
- ● See guidelines for implementation data
- ● Learning approaches are listed in order of power, the last being most powerful.

Menu of learning approaches to strengthen the behavioral component of an attitude.

- ● Act Out Behavior: Require the subject to "act out" the behavioral aspects of the attitude by role playing or perform the desired behavior in the operational setting. (3a)
- ● Public Commitment: Encourage student to publicly announce his conformity and allegiance to the desired attitude. (3b)
- ● Conditioning: Place student in a job-like setting and reinforce any behavior that seems to be a product of or compatible with the desired attitude. (3c)

Note:
- ● See guidelines for implementation data.
- ● Learning approaches are listed in order of power, the last being most powerful.

SUB-CATEGORY 11: ATTITUDE LEARNING (Con't)

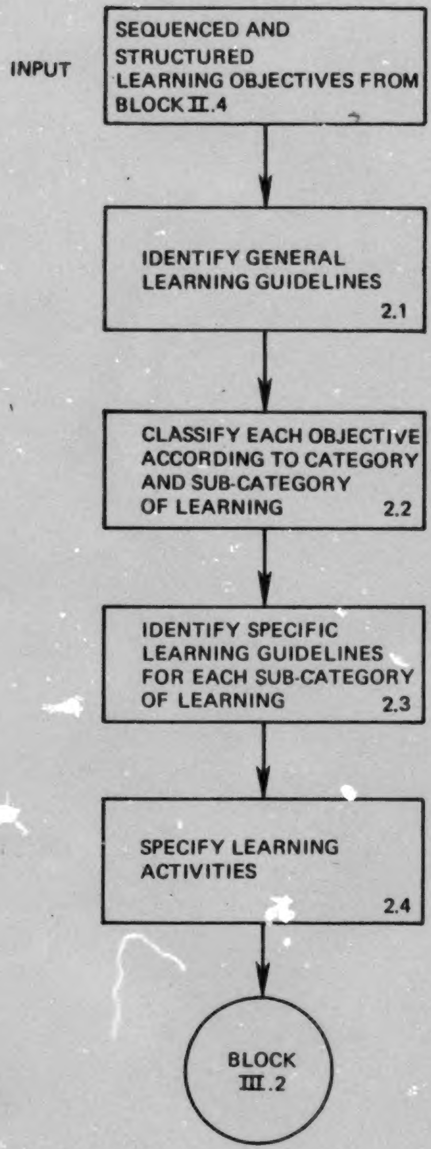
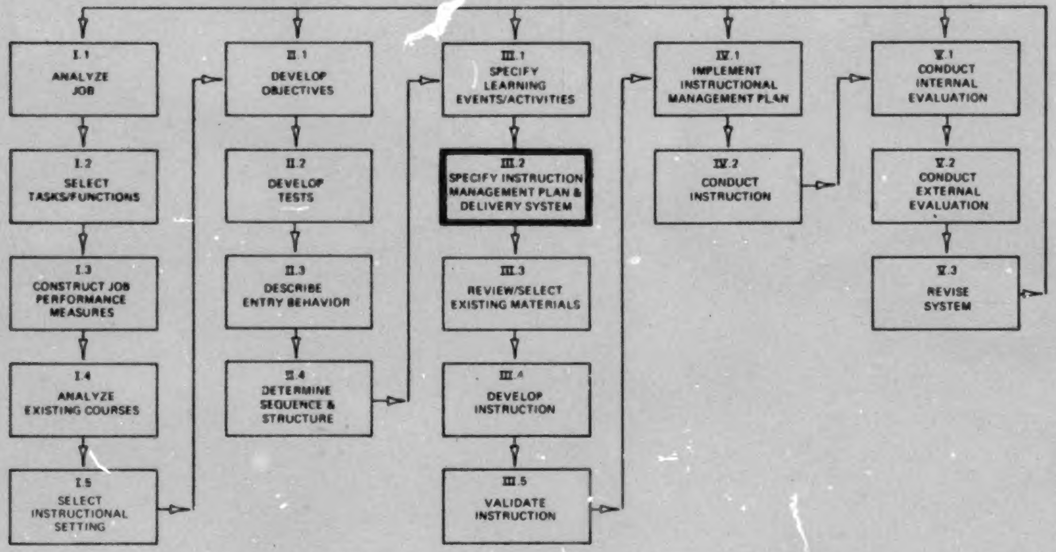

INPUT
SEQUENCED AND STRUCTURED LEARNING OBJECTIVES FROM BLOCK II.4
IDENTIFY GENERAL LEARNING GUIDELINES 2.1
CLASSIFY EACH OBJECTIVE ACCORDING TO CATEGORY AND SUB-CATEGORY OF LEARNING 2.2
IDENTIFY SPECIFIC LEARNING GUIDELINES FOR EACH SUB-CATEGORY OF LEARNING 2.3
SPECIFY LEARNING ACTIVITIES 2.4
BLOCK III.2

FIGURE III.1: Flowchart of Block III.1: SPECIFY LEARNING EVENTS/ACTIVITIES

BLOCK III.2:

SPECIFY INSTRUCTIONAL MANAGEMENT PLAN AND DELIVERY SYSTEM*


I.1 ANALYZE JOB
I.2 SELECT TASKS/FUNCTIONS
I.3 CONSTRUCT JOB PERFORMANCE MEASURES
I.4 ANALYZE EXISTING COURSES
I.5 SELECT INSTRUCTIONAL SETTING
II.1 DEVELOP OBJECTIVES
II.2 DEVELOP TESTS
II.3 DESCRIBE ENTRY BEHAVIOR
II.4 DETERMINE SEQUENCE & STRUCTURE
III.1 SPECIFY LEARNING EVENTS/ACTIVITIES
III.2 SPECIFY INSTRUCTION MANAGEMENT PLAN & DELIVERY SYSTEM
III.3 REVIEW/SELECT EXISTING MATERIALS
III.4 DEVELOP INSTRUCTION
III.5 VALIDATE INSTRUCTION
IV.1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV.2 CONDUCT INSTRUCTION
V.1 CONDUCT INTERNAL EVALUATION
V.2 CONDUCT EXTERNAL EVALUATION
V.3 REVISE SYSTEM

OVERVIEW

Media selection is the major means of determining how instruction is to be packaged and presented to the student. The choice of media mix affects both the effectiveness and cost of training. The instructional management plan is the set of procedures used to assure a smooth flow of students through the training system. The System Master Plan is the controlling document for the further development and implementation of the instructional system.

---

*Portions of this material have been adapted from: Braby, R., Henry, J. M., Parrish, F. W., Jr., and Swope, W. M. A technique for choosing cost-effective delivery systems (TAEG Report No. 16). Orlando, Fl.: Training Analysis and Evaluation Group, NTEC, April 1975.

SPECIFY INSTRUCTIONAL MANAGEMENT PLAN AND DELIVERY SYSTEM

1.0 INTRODUCTION

1.1 Media Selection

Media selection is the major means for determining how the instruction is to be packaged and presented to the student. The choice of the media mix affects both the effectiveness and the cost of training. Choosing the best or most usable mix of instructional media is difficult to do. A systematic approach requires a consideration of the nature of the objectives, the learning category of each group of objectives, use of learning guidelines, development of activities based on these guidelines, definition of the stimulus requirements for those activities, selection of media mixes that have the characteristics needed, consideration of constraints, costs of procurement and operation of alternative media, courseware development costs, and characteristics of the student population.

Media can be classified and described in multiple ways. Appendix A lists media and media mixes under the headings "Audio only, Audio-Visual, Computer-Simulation, Visual only, Print Materials, and Special and Non-standard Items."

1.2 Management Guidelines

An instructional system must be managed to ensure the smooth flow of students through the training system. It requires provisions for students, instructors, support personnel, facilities and equipment, courseware, and organization. All of these interact and a decision on scheduling any one may effect how the others must be managed. This is true even with an outwardly simple procedure, such as the situation when an instructor is lecturing, testing, grading, and moving on to the next lecture in a group. When each student is moving through different kinds of instructional materials at his own pace, even more planning is required.

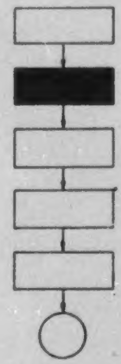
1.3 System Master Plan

A System Master Plan (SMP) is required to coordinate the efforts of those who will develop and implement the instructional program. While this document is subject to revision as instructional development continues, many reasonably firm decisions can be made at this point in the model.

The procedures for activities in this block are shown in Figure III.3, the fold-out page at the end of the block.

2.0 PROCEDURES

2.1 Select Pool of Media Mixes



The first step in this block is to identify a list of media mixes or alternatives. A media alternative is a form of instructional material that contains the stimulus criteria required by a specific learning activity. Identification of media alternatives is done by selecting those media within the learning category that have the required stimulus criteria. These become candidates for possible use as part of the final delivery system.

Required stimulus criteria are those basic qualities or capabilities of a medium (such as visual images, motion, color, and sound) that are required to carry out the intent of a learning activity. These required stimulus criteria can be specified by types of stimulus inherent in the learning activity, the student response, and performance feedback demands of the learning activity.

In Block III.1 the learning objectives were classified according to learning sub-category. The learning guidelines were identified for each sub-category. The list of learning guidelines for each set of similar objectives were then used to plan learning activities. Figure III.4 shows the reverse side of a Learning Objective Analysis Worksheet. In this block, you will primarily be using this reverse side of the form. Use this form as a worksheet to make media selections.

Following is a continuation of an example used in the last block. The terminal learning objective is: identify US and USSR destroyers. Some of the learning objectives are:

Learning Sub-Category	Learning Objective Action Statement
CLASSIFYING	1. Classify Claude Jones Class as US or USSR.
CLASSIFYING	2. Classify Forrest Sherman Class as US or USSR.
CLASSIFYING	3. Classify KOTLIN Class as US or USSR.
CLASSIFYING	4. Classify RIGA as US or USSR.
CLASSIFYING	5. Classify KOLA Class as US or USSR.

The learning activities for all five objectives are so similar that you may make decisions for the whole group at the same time.

Learning Category	Guide line	Media Selection Criteria	✓	Media Pool
Learning Activity				

COMPLEXITY CRITERIA

- Difficult Motor Acts
- Smooth Motor Performance at end of Training

STIMULUS CRITERIA

- Visual Form
  - Alphanumeric
  - Pictorial, Plane
  - Line Construction, Plane
  - Object, Solid
  - Full visual environment
- Visual Movement
  - Still
  - Limited
  - Full
- Visual Spectrum
  - Black and White
  - Gray Scale
  - Color
- Scale
  - Exact Scale
- Audio
  - Voice Sound Range
  - Full Sound Range
  - Ambient Sounds
- Other
  - Tactile Cues
  - Internal Stimulus Motion Cues
  - External Stimulus Motion Cues
  - Fine movement manipulative Acts
  - Broad Movement manipulative Acts

TRAINING SETTING CRITERIA

- Individual Trainee or team training at a Fixed Location
- Individual Trainees with simultaneous instruction or many locations
- Individual Trainee or team training with Independent Instruction at any Location
- Individual Trainee on-the-job
- Small Group
- Large Group at Single Location
- Team Setting

ADMINISTRATIVE CRITERIA

- Site of Courseware Development
  - Local
  - Central
- Magnitude of Acquisition Cost
  - Low
  - High

Media Selection and Rationale:

FIGURE III.4: Learning Objective Analysis Worksheet (Reverse Side)

Number	Learning Guidelines	Corresponding Activity
1	Clearly inform the trainee	State the objective in writing.
3	Display distinctive features of the pattern	Call attention to the differences in each ship in pictures.
8	Provide opportunities for practice	Practice identifying by looking at pictures with correct identification available immediately.
11	Provide full range of patterns	Show varying views of the ships.

The number for each learning guideline chosen for use for these learning objectives is listed in the extreme left-hand column. For this example, only a subset of the possible learning guidelines are used. The guideline statements for each learning guideline number are found under CATEGORY VII: Classifying - Recognizing Patterns, in Appendix A of Block III.1.

From those learning guideline statements, the learning activities shown in the example above were derived. This was done in Block III.1. These activities should have been entered in the Learning Activity column on the left-hand side of the worksheet (Figure III.5).

Each of these learning activities now must be translated into applicable stimulus criteria. The possible stimulus criteria are listed in the center column of the worksheet. If the activity involves sound alone, consider the choices under audio stimuli. If the activity involves visual stimuli, specify which visuals are needed. For each stimulus criteria applicable to the selected learning activities, put a check mark after the appropriate stimulus criteria on the worksheet. These are very important because they will be the basis for selecting the pool of media mixes.

Learning Category CLASSIFYING	Guide line	Media Selection Criteria	✓	Media Pool

Learning Activity

1. State the objective in writing.
2. Call attention to the differences in each ship in the pictures.
3. Practice identifying by looking at pictures with correct identifications available immediately.
4. Show varying views of the ships.

COMPLEXITY CRITERIA
- Difficult Motor Acts
- Smooth Motor Performance at end of Training

STIMULUS CRITERIA
- Visual Form
  - Alphanumeric
  - Pictorial, Plane
  - Line Construction, Plane
  - Object, Solid
  - Full visual environment
- Visual Movement
  - Still
  - Limited
  - Full
- Visual Spectrum
  - Black and White
  - Gray Scale
  - Color
- Scale
  - Exact Scale
- Audio
  - Voice Sound Range
  - Full Sound Range
  - Ambient Sounds
- Other
  - Tactile Cues
  - Internal Stimulus Motion Cues
  - External Stimulus Motion Cues
  - Fine movement manipulative Acts
  - Broad Movement manipulative Acts

TRAINING SETTING CRITERIA
- Individual Trainee or team training at a Fixed Location
- Individual Trainees with simultaneous instruction or many locations
- Individual Trainee or team training with Independent Instruction at any Location
- Individual Trainee on-the-job
- Small Group
- Large Group at Single Location
- Team Setting

ADMINISTRATIVE CRITERIA
- Site of Courseware Development
  - Local
  - Central
- Magnitude of Acquisition Cost
  - Low
  - High

Media Selection and Rationale:

FIGURE III.5: Sample Worksheet

Some media are generally more expensive than others. As you choose the stimulus criteria keep the comparative costs in mind. Try to use the less expensive stimuli when they will do the job. Table III.7 displays the media from high cost on the top left side to low cost on the top right side and bottom of the tablee.

TABLE III.7 : Comparative Media Costs

Higher Cost ← → Lower Cost

	Film		Television
Full Motion/ Commercial Standard	16mm Super 8	Optical Sound	2 Inch Quadraplex Broadcast
Full Motion/ Non-Standard	Super 8	W/WO Sound	1 Inch Helical Video Tape 3/4 Inch Helical Video Tape 1/2 Inch Helical Video Tape
Variable Rate	Bessler Cue-See Norelco "Pip"		Magnetic disc interface
Still	35mm Slide Filmstrips (loops)		Video disc

↑ Higher Cost ↓ Lower Cost

EXAMPLE

Activity 1 requires a visual form--alphanumeric (combination of letters and numbers)
Activity 2 requires a visual form--alphanumeric and pictorial, plane.
Activity 3 requires the same visual form plus additional alphanumeric means of giving feedback.
Activity 4 requires the same visual forms.

Now, using the worksheet, go down the list under Visual Form and check:

"Alphanumeric"
"Pictorial, plane."

Under Visual Movement, nothing indicated a need for movement, so check:

"Still."

Under Visual Spectrum, nothing indicated a need for color so check:

"Black and White."

Under Scale, nothing indicated exact scale.

Under Audio, no activity indicated a need for audio.

The worksheet should now look like Figure III.6.

The next step is to take the learning sub-category (the learning objectives were classified according to learning sub-category in Block III.1) for the learning objective or group of learning objectives, and locate, in Appendix B, the appropriate matrix for that learning sub-category. A sample of one of the matrices is shown in Figure III.7.

The items on the matrix are:

A. Criteria for Media Selection

B. Complexity Criterion

C. Stimulus Criteria

D. Training Setting Criteria

Learning Category CLASSIFYING	Guide line	Media Selection Criteria	✓	Media Pool

Learning Activity

1. State the objective in writing.
2. Call attention to the differences in each ship in the pictures.
3. Practice identifying by looking at pictures with correct identifications available immediately.
4. Show varying views of the ships.

Media Selection Criteria	✓
COMPLEXITY CRITERIA	
Difficult Motor Acts	
Smooth Motor Performance at end of Training	
STIMULUS CRITERIA	
Visual Form	
Alphanumeric	✓
Pictorial, Plane	✓
Line Construction, Plane	✓
Object, Solid	
Full visual environment	
Visual Movement	
Still	✓
Limited	
Full	
Visual Spectrum	
Black and White	✓
Gray Scale	
Color	
Scale	
Exact Scale	
Audio	
Voice Sound Range	
Full Sound Range	
Ambient Sounds	
Other	
Tactile Cues	
Internal Stimulus Motion Cues	
External Stimulus Motion Cues	
Fine movement manipulative Acts	
Broad Movement manipulative Acts	
TRAINING SETTING CRITERIA	
Individual Trainee or team training at a Fixed Location	✓
Individual Trainees with simultaneous instruction or many locations	✓
Individual Trainee or team training with Independent Instruction at any Location	
Individual Trainee on-the-job	
Small Group	
Large Group at Single Location	
Team Setting	
ADMINISTRATIVE CRITERIA	
Site of Courseware Development	
Local	
Central	✓
Magnitude of Acquisition Cost	
Low	✓
High	

Media Selection and Rationale:

FIGURE III.6: Sample Worksheet

SUB-CATEGORY 2
CLASSIFYING

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

A Criteria for Selecting Instructional Delivery Systems		F Alternative Instructional Delivery Systems										
		G Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm					H Delivery Approaches NOT Permitting Complete Application of Learning Guideliens and Algorithm					
		I CAI w/Adjunct Equipment and Materials	Study Card Sets	Microfiche	Teaching Maching - Branching	Simulator with Adjunct Displays or Instructor	Slide Sets with Instructor	Traditional Classroom with AV Materials	Audio Recorders - Disc or Tape	Specimen Set	Sound Slide/Film Strip Program	
C Stimulus Criteria												
● Visual Form												
Alphanumeric		X	X	X	X	X	X	X			X	
Pictorial, Plane		X	X	X	X		X	X			X	
Line Construction, Plane		X	X	X	X		X	X			X	
Object, Solid						X				X		
Environment						X						
● Visual Movement												
Still		X	X	X	X		X	X		X	X	
Limited		X			X			X			X	
Full						X		X				
● Scale												
Exact Scale						X				X		
● Audio												
Voice Sound Range		X			X	X	X	X	X		X	
Full Sound Range						X			X			
Ambient Sounds						X						
Other Tactile Cues						X				X		
Internal Stimulus Motion Cues						X						
External Stimulus Motion Cues						X						
D Training Setting Criteria												
● Individual Trainee at a Fixed Location		X	X	X	X	X	X		X	X	X	
● Individual Trainee with Independent Instruction at Any Location			X	X					X		X	
● Small Group							X	X	X		X	
● Large Group at Single Location							X	X	X		X	
E Administrative Criteria												
● Site of Courseware and Special Hardware Development												
Local			X	X	X		X	X	X	X	X	
Cei		X	X	X	X	X	X	X	X	X	X	
● Magnitude of Acquisition Cost												
Low			X	X			X	X	X	X	X	
High		X			X	X						

FIGURE III.7: Sample Matrix

E. Administrative Criteria

F. Alternative Instructional Delivery Systems:

G. Media Approaches which permit the use of all learning guidelines (events) for that learning category, and

H. Media Approaches that permit use of only some of the learning guidelines.

I. The names of the media.

It should be noted that all of the above criteria for media selection, which includes sections B, C, D, and E of the Matrices will not be present for each sub-category. When one or more criteria are missing it is assumed that the media choices available for that particular sub-category cannot be differentiated on the basis of the missing criteria or are not needed. That is, each medium is presumed to be equally effective for delivering the instructional material in reference to the missing categories. Therefore, the media selection will be based on the criteria that are present and on cost factors.

In the example, note the Stimulus Criteria items checked in Figure III.7. For each stimulus criteria checked, follow across and note where x's appear for that stimulus criteria under different media approaches that have x's for all the checked stimulus criteria items.

Thus far in the example, the following media choices should have been noted.

CAI	Study Card Sets	Microfiche	Teaching Media Breakdown		Slide sets with instructor	Traditional Classroom with AV Materials	Sound Slide/Film strip programs
	X	X	X		X	X	X

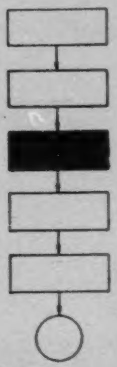
Next, look at other criteria. Going on down the matrix to the Training Setting Criteria, are there any special constraints that need to be considered? In the example, the terminal objective is for training in school or in a unit. That would include individual trainees with independent instruction at any location. Now select the media with matching x's. These three remain.

Study card sets	Microfiche		Sound slide/film strip programs
X	X		X

Now, go on down the matrix to Administrative Criteria. In the example, the course is to be developed centrally and you have been directed to keep the acquisition costs low.

This additional information does not change the set of three choices. Record the three choices on the worksheet. The worksheet will now look like Figure III.8.

2.2 Make Media Selection



2.2.1 Reject Impractical Approaches

Each item remaining in the list of media should be evaluated in terms of the practicality of its use in the specific training system. Reject those media

Learning Category
CLASSIFYING

Learning Activity

1. State the objective in writing.
2. Call attention to the differences in each ship in the pictures.
3. Practice identifying by looking at pictures with correct identifications available immediately.
4. Show varying views of the ships.

Guide line	Media Selection Criteria	✓
	COMPLEXITY CRITERIA	
	Difficult Motor Acts	
	Smooth Motor Performance at end of Training	
	STIMULUS CRITERIA	
	Visual Form	
	Alphanumeric	✓
	Pictorial, Plane	✓
	Line Construction, Plane	✓
	Object, Solid	
	Full visual environment	
	Visual Movement	
	Still	✓
	Limited	
	Full	
	Visual Spectrum	
	Black and White	✓
	Gray Scale	
	Color	
	Scale	
	Exact Scale	
	Audio	
	Voice Sound Range	
	Full Sound Range	
	Ambient Sounds	
	Other	
	Tactile Cues	
	Internal Stimulus Motion Cues	
	External Stimulus Motion Cues	
	Fine movement manipulative Acts	
	Broad Movement manipulative Acts	
	TRAINING SETTING CRITERIA	
	Individual Trainee or team training at a Fixed Location	✓
	Individual Trainees with simultaneous instruction or many locations	✓
	Individual Trainee or team training with Independent Instruction at any Location	
	Individual Trainee on-the-job	
	Small Group	
	Large Group at Single Location	
	Team Setting	
	ADMINISTRATIVE CRITERIA	
	Site of Courseware Development	
	Local	
	Central	✓
	Magnitude of Acquisition Cost	
	Low	✓
	High	

Media Pool

Study card sets

Microfiche

Sound slide/film strips

Media Selection and Rationale:

FIGURE III.8: Sample Worksheet

that are impractical. The media types that remain are considered to be candidates for use in the proposed system, and will be subjected to a cost analysis. Some of the factors that may be important in rejecting media types are:

1. Marginal Technical Solutions: The learning guidelines cannot be easily carried out with the medium.
2. State-of-the-Art: The basic medium is under development or test and may not be available for practical application by the time it is required.
3. Size of System: Some media are useful within large training programs, others are suited only for small programs, and therefore may not be suited to the size program being considered.
4. Interface with Existing Program: Many new courses must be designed to fit into existing programs, which places constraints on the new courses; e.g., equipment on hand, available classrooms, scheduling practices, etc.
5. Time to Produce Media: Media which require long lead times for development may not be useful when scheduled ready-for-training dates do not allow a long development cycle.
6. Budget Cycle Constraints: While the application of some of the powerful training approaches, such as CCTV (closed circuit television), may result in low costs per student graduate, the initial investment is substantial. Unless these resources appear in existing budgets, the application of these techniques to an immediate problem is not feasible.

7. Adoption of Innovations: Project team members frequently resist innovations. If the proposed media is significantly different from existing techniques, either adequate resources must be focused upon gaining acceptance for the innovation, or a more traditional approach must be selected.
8. Courseware Development: If the courseware is to be locally developed, skilled personnel, equipment, time, and dollars must be available.
9. High Cost Alternatives: The projected life cycle cost of a media approach may be significantly higher than other equally useful alternatives. Reject high cost alternatives.
10. Learning Style of Trainees: If trainee has low reading ability or would be limited in his ability to use certain kinds of media, then reject these media as inappropriate.
11. Other Constraints: A variety of other practical factors should be considered; e.g., command policy and existing investment in production facilities.

Table III.8 gives examples of possible rejection rationale for different media.

Based on the rejection rationale just discussed, make a tentative final media selection. In the example, apply some experience and judgement. Sound slide programs can be used by individuals and by groups, but they also have an audio track that is not required. The microfiche requires a reader which the study card sets do not. Make a tentative choice for the study card sets and the microfiche. The worksheet will now look like Figure III.9.

TABLE III.8: EXAMPLE OF REJECTION RATIONALE

Initial List of Media	Rejected Impractical Approaches
1. Laboratory Carrel	
2. Teaching Machine, Branching with Adjunct Equipment	
3. Programmed Text, Branching with Adjunct Material and Equipment	Rejected: Too extensive use of written material.
4. Procedure Trainer with Adjunct Display and Logic	
5. Procedure Trainer with Instructor	
6. Logic Trainer	Rejected: Marginal Technical Solution.
7. Operational Equipment with (Programmed) Manuals	
8. Operational Equipment with Instructors	
9. Microform with Information Mapping and Adjunct Equipment	Rejected: Too extensive use of written material.
10. Simulator with Adjunct Displays	Rejected: Budget Cycle Constraints.
11. Television, Video Disc and Adjunct Equipment	Rejected: Inadequate State-of-the Art.

NOTE: Example assumes that trainees have low reading ability.

Learning Category
CLASSIFYING

Learning Activity

1. State the objective in writing.
2. Call attention to the differences in each ship in the pictures.
3. Practice identifying by looking at pictures with correct identifications available immediately.
4. Show varying views of the ships.

Guide line	Media Selection Criteria	✓
	COMPLEXITY CRITERIA	
	Difficult Motor Acts	
	Smooth Motor Performance at end of Training	
	STIMULUS CRITERIA	
	Visual Form	
	Alphanumeric	✓
	Pictorial, Plane	✓
	Line Construction, Plane	✓
	Object, Solid	
	Full visual environment	
	Visual Movement	
	Still	✓
	Limited	
	Full	
	Visual Spectrum	
	Black and White	✓
	Gray Scale	
	Color	
	Scale	
	Exact Scale	
	Audio	
	Voice Sound Range	
	Full Sound Range	
	Ambient Sounds	
	Other	
	Tactile Cues	
	Internal Stimulus Motion Cues	
	External Stimulus Motion Cues	
	Fine movement manipulative Acts	
	Broad Movement manipulative Acts	
	TRAINING SETTING CRITERIA	
	Individual Trainee or team training at a Fixed Location	✓
	Individual Trainees with simultaneous instruction or many locations	✓
	Individual Trainee or team training with Independent Instruction at any Location	
	Individual Trainee on-the-job	
	Small Group	
	Large Group at Single Location	
	Team Setting	
	ADMINISTRATIVE CRITERIA	
	Site of Courseware Development	
	Local	
	Central	✓
	Magnitude of Acquisition Cost	
	Low	✓
	High	

Media Pool

Study card sets

Microfiche

Sound slide/film strips

Media Selection and Rationale:

Study Card Sets:

Since the study card sets are less expensive and do not require a reader, and at the same time can present the instructional material as effectively as microfiche or a film strip, the card sets were selected as our media choice.

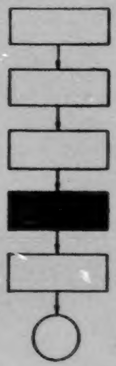
Sound was not required, therefore the use of sound slide/film strip was not chosen. In addition to this, a longer production time would be required for sound slide/film strip.

FIGURE III.9: Sample Worksheet

2.2.2 Recommend the Optimum Media Mix

The selection of one of the media mixes and the justification of this choice is based on weighing the variations in cost among the useful candidate media, along with the relevant administrative factors, that influence media selection irrespective of technical solutions.

2.3 Determine Management Guidelines



2.3.1 Mode of Instruction

Instructional management plans can be usefully divided into two general categories: those employing block scheduling, and those using self-pacing modes. Group instruction has been widely used in educational settings, most notably in public schools, and consists of an instructor managing a number of learners in a fixed sequence of events and activities. All of the learners go through the same sequence at the same time.

Self-pacing, the second general kind of instructional management, is usually the preferred mode in ISD courses. Which of the forms, or variations, to use should be based on the setting, the needs of the learners, and the resource constraints.

Details of various management plans are given in Appendix C of this block.

2.3.2 Selecting Block Scheduling Plans

Select block scheduling when any of the four following conditions exist:

1. When socializing, or exchange of views, or other such group interactions are the desired instructional outcome of the course;
2. When the performance conditions of the objectives of a course indicate group or team performance is required;
3. When course content is so unstable as to make it change often;
4. When a course is known to have a short life.

A common method of group assignment is random; that is, students are assigned to groups alphabetically, by service number, etc., or in the order in which they happen to walk through the door. This results in a wide range of student characteristics.

Even when a group management plan is used, some improvement can be achieved through the method in which students are assigned to the groups. Two alternate methods of group assignment are:

1. Ability grouping - Students are assigned to groups on the basis of aptitude testing.
2. Achievement grouping - Students are assigned to groups according to their performance on pretests of units of the course. This sometimes allows students to skip some units and move on to the following units, perhaps to join more advanced classes.

2.3.3 Selecting Self-Paced Management Plans

Because students are so different in their rates of learning and other characteristics that affect behavior in course work, self-pacing is usually preferred over regular block scheduling. This does not mean that in a self-paced plan, a group cannot meet. For some lessons, all members of the class might participate as a group, but not be kept in lock-step. Or, as a certain number of students reach the point of needing a specific type of instruction, they can meet as a small group and then again proceed at their own paces. In general, though, individuals come to the instructional settings with such a variety of achievements that adapting the instruction to these differences is desirable in order for the maximum number to reach mastery. In a block scheduled system, individuals are often moved on or out regardless of whether or not they master the objectives of instruction. In the self-paced setting, adjustments in the system are made so that it adapts to many factors:

- Variations in the experience each individual has had before coming to the instructional setting;
- Personal learning and performance rates.

Whatever these individual differences are, the system must account for them in enough ways to result in student mastery of objectives, rather than resulting only in comparisons of student performance on one instructional path.

2.3.4 Course Management

Someone must be in charge of administering a course whether it is offered in a group mode or an individual mode. An instructor is often assigned to this position. However, in large training facilities that process a high volume of students, administrative functions are sometimes assigned to one member of an instructor team or to a central office staff.

Administrative duties include activities such as scheduling, requisition, supervision, monitoring, documentation, and reporting. These activities apply mostly to the course itself and might be called course management activities.

The school or instructional unit may be organized in various ways. The organization may be fixed. If so, adapt the management plan to fit it, if not change it to fit the needs. Two organization charts are displayed in Figure III.10.

Develop a management plan that will fit the setting, delivery system, and any command or resource constraints. Provide management for students, instructors, support personnel, facilities and equipment, and information.

2.3.5 Students

For students, decisions must be made about entry points, scheduling, completions, recycling, and exiting. Students may be allowed to enter only at one point or, as a result of testing, permitted to enter at an advanced point or enter only after some preparatory instruction. Most of these decisions were made in Block II.3, but must be finalized here.

EXAMPLE

> In a Flight Screening Program, T-41 coruse, students with prior flying experience may be sufficiently proficient to be advanced. The levels of performance are established in the course syllabus. Scheduling can be individual, by homogeneous grouping, or by mixed grouping. Individuals may be paced or allowances made for self-pacing.

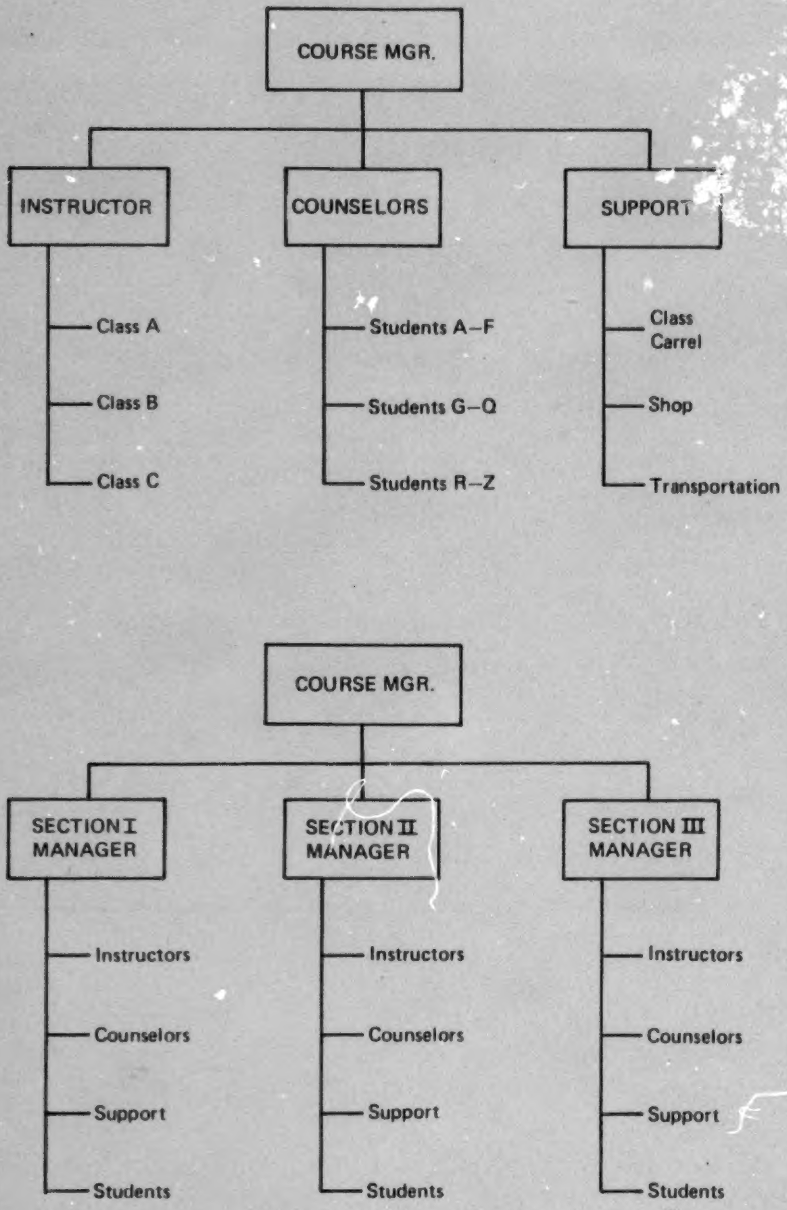

COURSE MGR.
INSTRUCTOR
COUNSELORS
SUPPORT
Class A
Class B
Class C
Students A–F
Students G–Q
Students R–Z
Class Carrel
Shop
Transportation
COURSE MGR.
SECTION I MANAGER
SECTION II MANAGER
SECTION III MANAGER
Instructors
Counselors
Support
Students
Instructors
Counselors
Support
Students
Instructors
Counselors
Support
Students

FIGURE III .10: Two Alternate Organization Charts

EXAMPLE

> In the T-41 course which is designed to provide a selection process to identify trainees who possess the potential to complete Undergraduate Pilot Training, each student is considered individually and is allowed to progress to subsequent lessons on a proficiency basis.

2.3.5 Completions/Accumulations

If the individuals pace themselves in the course they will have varying completion times. This requires either varied exit times or some provisions to accumulate students within the course. For instance, accumulated students can become tutors or be given additional instruction.

EXAMPLE

> In the T-41 course, the airmanship examination is individually corrected to 100% during the critique. Students are authorized early release from the critique hour on a proficiency basis. (Students with a 100% grade are not required to attend.)

2.3.6 Identification and Control of Marginal Students

Students who fail or have trouble with part or all of the course may be allowed to repeat the part they failed, and proceed, or recycle to the beginning. There may be a need to limit the number of times a student may review or recycle.

EXAMPLE

For the T-41 course, the rules for classification as a marginal student plus the repeat or recycle control procedures are described.

Some guidelines for identification and control of marginal students are as follow:

1. A student will be considered marginal when he:

   a. Receives a grade of U preceded by three or more grades of F or below.
   b. Received a grade of U, and has a U on one of the preceding three lessons.
   c. Fails an initial progress check.
   d. Displays substandard performance to the extent that close monitoring of his progress is required; for example, four or more consecutive grades of F or below.

2. When a student is identified as marginal, the following procedures will apply:

   a. He will be counseled by a flight supervisor and a record of counseling will be made on the student activity record. This counseling is accomplished to determine the student's degree of understanding of his weaknesses and recommendations are made to assist the student in overcoming these weaknesses.
   b. If a student does not receive at least a grade of good on his next flight, final check excluded, he will be counseled by the instructor, or an assistant, and a determination will be made as to specific training given on subsequent flights.
   c. Students will be counseled and their training records reviewed prior to the administration of progress checks.
   d. Procedures above reflect the minimum required counselings; however, any further lack of progress will require counseling assistance by the TRCO, assistants, or flight supervisors.
   e. When identified as marginal, the student will be scheduled to fly with no more than two instructor pilots.

3. The contractor and TRCO will evaluate the records of identified weak students on a continual basis until normal progress is established or a progress check is warranted.

2.3.7 Program Completion

All of the students exit the program either as graduates or "program incomplete."

When a limit is placed on the number of times a student may review or recycle, there is a need to provide an exit for the "program incomplete" students. There are also program incompletes other than failures, who drop out because of other reasons.

Program completion may be scheduled for the group, or, when self-pacing has been used, provision must be made for a flow of graduates. There is an interface with the using command and personnel system at this point.

Like each of the other student management considerations, a decision on this exiting has implications on the others. The plans for all of these become the basis for the System Master Plan (SMP) which will be discussed in the next section and are inputs to the instructor's guide.

2.3.8 Instructors

The second main group for which the management plan is designed is the instructors. For instructors make decisions about their roles in instruction, testing, record keeping, and motivating. This instruction role may include presenting information, giving demonstrations, providing feedback, tutoring students, and giving assignments.

EXAMPLE

> In the T-41 course: A study assignment for the next day's lesson will be made at the close of each training period as directed in the appropriate instructor guide. The student is expected to come to each class prepared to participate in classroom discussions on the material being studied. Evaluation devices will be used as frequently as practicable to promote student learning.

Testing roles may include only distributing written tests, monitoring, timing, and collecting the tests, or the instructor may also be responsible for scoring objective tests or even scoring performance tests.

EXAMPLE

The types of tests or checks, and the criteria for passing the T-41 course are listed below.

Phase Check. A flight check required by the syllabus of instruction.

The final check will normally be administered between 12.5 and 13.0 hours for average students. A representative cross section of manuevers are flown as specified. Check flights will be considered incomplete only when maneuvers flown were insufficient to enable the check pilot to make a judgment of the student's overall performance. The student will be considered below acceptable standards if he fails this check. A recheck will be accomplished without intervening instruction. If he fails the recheck it will be considered a final progress check and will result in recommendation for elimination.

Initial Progress Check (IPC). A special flight check given by supervisors to evaluate the progress and skill level of a student in a particular training phase, or a

Final Progress Check (FPC): A special flight check given by the appropriate supervisor to evaluate the skill level of a marginal or deficient student to determine whether the student has the potential to successfully complete UPT or should be recommended for elimination, are given when:

1. A student receives three unsatisfactory grades, fails to solo in 11.2 hours, or when directed by the TRCO.
2. If a student fails to solo on the supervised solo sortie he will be scheduled for an IPC. He must solo on the IPC in order to pass the check. If he passes the check, and a representative cross section of maneuvers are flown, the flight will constitute a completed phase check. If he fails the check he will be scheduled for an FPC on which he must solo in order to pass. Failure of the FPC will result in recommendation for elimination. Satisfactory completion of an FPC brought about by failure to solo at 11.2 hours will be considered as completion of the FPC.

3. Initial progress checks flown as a result of three unsatisfactory grades will be flown at the level at which the second unsatisfactory grade was awarded.
4. If a student fails the C110 sortie he will fly the remaining sortie with a military TRCO. He will be scheduled for an FPC. Failure of the FPC will result in recommendation for faculty board action. Satisfactory completion of the FPC will be considered as completion of the FPC.
5. In addition to testing, the instructor may be responsible for grading. The T-41 grading instructions are examples of the rating scale and the evaluation procedures.

This section outlines the responsibilities and procedures for flight-line evaluation and grading for this course.

1. Levels of Performance:

   a. Unable to Accomplish (U). The student lacked sufficient knowledge, skill, or ability to perform the element, operation, maneuver, or task correctly, without assistance.
   b. Fair (F). The student performed the element, operation, maneuver, or task, but made some false starts, repetitions, or minor errors of omission or commission.
   c. Good (G). The student performed the element, operation, maneuver, or task correctly, with little hesitation.
   d. Excellent (E). The student performed the element, operation, maneuver, or task correctly, quickly, and efficiently.
   e. Demonstrated (D). Enter the letter D when the maneuver is demonstrated only but not practiced.
   f. Practice. The student conducts drills in the job element or maneuver to develop proficiency.
   g. Special Syllabus Requirements. Those items required on a one-time basis and no provisions are made to indicate individual completion on the record of training.

2. Procedures:

   a. The rating scale above is used to evaluate (1) the student's characteristic performance of each maneuver attempted during each dual ride, and (2) his performance of maneuvers on supervised solo missions which can be observed without compromising flying safety. This is an absolute rating scale, and the student's performance must be judged against the perfectly performed maneuver. Do not consider the type or amount of training the student has received. Therefore, when a student is introduced to a maneuver he may receive several F (fair) or U (unable to accomplish) grades. This does not mean that the student is unsatisfactory, but he may be progressing normally, since the average student may be unable to accomplish many maneuvers the first time. As soon as possible after the flight, rate the student on the applicable ATC form.

b. Immediately after evaluation of the individual maneuvers, the student's overall performance is rated. The instructor, using a relative type rating scale, determines if on the basis of training received the overall grade is excellent, good, fair, or unsatisfactory. The student may receive grades of F (fair) or U (unable to accomplish) on individual maneuvers that are relatively new to him and still receive as high as an excellent grade for his overall performance. An overall grade of unsatisfactory is assessed if a maneuver is graded U when the student has not attained the required satisfactory level of performance. Fair (F) is the minimum satisfactory level of performance.

Record keeping roles range from checking attendance to monitoring a computerized information management system. Recording procedures must be specified as to timing, format, coding, reports, etc.

The forms used for the T-41 course include flying records and activity records which are put in the grade folder. These are described below.

3. Grade Folder:

   a. Flying training records will be maintained in a common folder:

      (1) LEFT SIDE:

         (a) ATC Form 860 Student Flying Record
         (b) ATC Form 878 T-41 Contact Record of Training S-V8A-A
         (c) ATC Form 879 T-41 Contact Grade Sheet

      (2) RIGHT SIDE:

         (a) ATC Form 803 Student Activity Record

   b. ATC Form 860, "Student Flying Record." The student flying record is used to record a chronological sequence of training to afford instructors and supervisors a ready reference for continuity of training.
   c. ATC Form 803, "Student Activity Record," ATC forms will be filed with the most recent form on top. Remarks

should be factual, objective, and concise and will be prefaced with an appropriate short title.
A comprehensive record of counseling will be entered on the Form 803. All comments will be signed by the person making the entry, as well as by the student. Documentation is required for:

(1) Change of instructor
(2) Any lesson graded overall fair or unsatisfactory
(3) Recommendation for elimination
(4) Counseling
(5) Assignment to marginal student status
(6) Grade folder review prior to progress checks
(7) Syllabus deviations or training waivers
(8) Incomplete lessons
(9) Special requirements not completed
(10) Any unusual occurrences that could affect student progress (airsickness, prolonged grounding, etc.)

2.3.9 Support Personnel

The next group is the support personnel. When additional personnel will be required, the management plan must specify who, when, and where. Support personnel include secretarial help, drivers, content experts, extra test monitors, fixture or equipment operators, or movers, etc.

2.3.10 Facilities and Equipment

Facilities include indoor or outdoor space. The management plan must not only specify what the needs are, but also the local regulations for scheduling the facilities.

Equipment includes the delivery system where applicable and any equipment required by the instructor for demonstration of testing or by the students for practice. It may be actual objects, simulators, or training aids. Equipment must be scheduled from the source, there must be a plan for utilization, maintenance, and any improvements or modifications that are required for training.

EXAMPLE

Part of the facility/equipment list from the T-41 is shown below.

TRAINING AIDS

1. Demonstrators and Trainers:	Basis of Issue
a. Flight line	
(1) Plastic Model Aircraft, T-41	1/instructor
(2) Composite Flight Attitude Indicator T-41 Dem, 6910L1000133J	12/course
(3) Instrument Panel, T-41 Model A, 6910L100179J	4/course
b. Academics	
(1) Radio Aids, T-41, 69L100161J	1/course
(2) Training Films:	
(a) FA703, (FLC8-0073), How Airplanes Fly (Mandatory)	1/course
(b) SFP1139, The USAF Safety Story (Optional)	

2.3.11 Consumables and Courseware

Consumables or expendables include all the paper, writing instruments, and any other things that are used up during instruction. Study card sets that can be kept by the learners or workbooks that can only be used once are consumable. All of the consumables and any non-consumable adjunct instructional materials like slides or books also must be provided.

EXAMPLE

The bibliography and basis of issue from the T-41 course is:

BIBLIOGRAPHY

	Basis of Issue
1. Training Manuals, Pamphlets and Technical Orders:	
a. AFP 50-56, USAF Physical Fitness Program (Male)	1/student
2. Study Guides and Workbooks:	
a. P-V4A-A-AM-SW, Airmanship	1/student
b. P-V4A-A-FL-SC, Flight Line, T-41	1/student
3. Instructor Guides:	
a. P-V4A-A-AM-IG, Airmanship	10/course
b. P-V4A-A-FS-IG, Flying Safety	10/course
c. P-V4A-A-PT-IG, Physical Training	10/course
4. Text References (Optional):	
a. Seaton, Physical Education Handbook	1/course

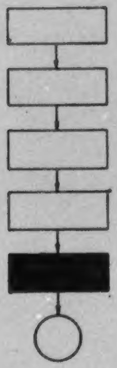
2.3.12 Miscellaneous Considerations

For all of the tangible things: facilities, equipment, consumables, and courseware, the management plan must describe how many are needed, where they can be obtained, what approvals are needed from whom, and how much time is required to get them.

The needs for facilities, equipment, and consumables for the course have to be defined and arrangements made to have them available at the proper times. Scheduling and utilization will have to balance against other competing demands for the resources. Regular maintenance and provision for repairs must be made. Needed modifications or improvements to equipment or facilities will require permission and resources.

The management system is also a reporting unit to the organization. It not only is responsible for all the above, but also for keeping the school command notified of all required information plus any special problems and unexpected changes or trends.

2.4 Develop System Master Plan



One of the more significant documents in the ISD process is the System Master Plan (SMP). This document will indicate exactly how the course is to be conducted, how the students are to be managed, when and where they will be tested, and all other specifications for the course.

The SMP has two principal functions:

1. To indicate to all who use it what is to be done to get the course all together. How the pieces work together, and what each student is to do.
2. The SMP will be used by the internal evaluator to plan and conduct the internal evaluation. The more explicit the plan, the more carefully and exactly the course can be evaluated. The SMP will serve as the basis for finding discrepancies in course implementation.

The SMP will specify the media to be used, the kinds of instructional materials to be used, the tests that will be given, and when they will be given, what the instructors will be expected to do, what the time schedule and physical layout of the facilities is, how students can be placed in more advanced units or how they can by-pass or retake the units, and the other necessary technical details of the course plan required by standard operating procedure or regulation.

The intention of the system master plan is to communicate with instructors, managers, students, and evaluators exactly what is supposed to happen in relation to everything else that is supposed to happen. The SMP also is a major input to the Instructor's Manual and instructions to students to be prepared in Block III.4.

The decisions made in the previous section on determining management guidelines are major inputs to the System Master Plan. Much of the other inputs to the plan are also already available from other parts of this block and other blocks in the Model. It should be emphasized that the SMP developed here is a tentative plan that most likely will be revised as it is put into use.

The details of the SMP will depend largely on the training setting selected. If the setting is the RS, the principal problems will be with the local resources and instructors as well as with the factors already mentioned in this section.

If the setting is FOJT, the SMP will contain much of the same information, but, in addition must include all of the additional requirements brought about by the location of the trainees in areas remote to the school. For example, the provisions made for training instructors (FOJT supervisors) will necessarily differ from the arrangements for instructor training in the RS.

Because there will not often be an aggregated staff capable of providing immediate assistance to the instructor, the manuals and other supplied materials will need to be in a form that can readily be used on the job. The instructor's manual should be in the form of a JPA to the fullest extent possible. There should also be a provision for the FOJT instructor to be able to talk directly with the course manager or his representative in person or by telephone in order to resolve problems which arise through the use of the materials.

Since training records must be maintained in remote locations, some direct means must be established for keeping the records of training accomplishments in the records of the trainee. Thus, record keeping becomes as important a part of FOJT as proper administration of the JPMs and the conduct of instruction. If the course is to improve through time, there must also be provision for evaluation of the course performance.

Self-Teaching Exportable Packages (STEPs) can become an important part of the FOJT program in those DOS which require additional media support. The SMP should take into account which of the tasks or terminal learning objectives will be served directly by the facilities and equipment found on the job and which must be served by the STEPs: Discussions with potential FOJT supervisors should be an important part of the planning process and the outcomes of these discussions should be given careful weighing in the final decisions. The program, the STEPs, and the record keeping of the course should all be kept as simple as possible to avoid placing an unnecessary burden on the operating units.

If the course is to be offered by Installation Support Schools, the requirements will be different from those found in FOJT or in RS. Since many courses offered by ISS will be of a temporary nature and others will be of an infrequent nature, the SMP must take into account all of the resources available in the ISS, the needs for the course on an annual basis, and the range of alternatives available. For example, if the course is offered regularly to larger numbers of trainees, more complete packages of learning materials can be developed to take full advantage of the chosen media and student management system.

If the annual requirement is high, it may be reasonable to consider developing a packaged self-paced course suitable for offering on a continuous basis in those locations where facilities permit. Often, Learning Resource Centers (LRCs) will be available where all forms of multimedia packages can be used. Other locations will be very hard pressed to use anything other than the simplest print media with instructor support packages. In the latter cases, the quality of the instructor's manual must be high enought to achieve the desired results.

Preparation of SMPs for any setting except RS will require considerable coordination with all of those who will be involved in the use of the course package. These plans should be made as early as possible in order to take advantage of the inputs from the full range of people affected. Most often, more than one command will be involved and coordination through normal channels will probably take longer than when everyone is in the same location.

Many exemplary programs exist within the services which can serve as initial starting points for those who are planning a new training setting for the first time. The Air Force has a well established and proceduralized FOJT program which is a fundamental part of the Weighted Airman Promotion System. Those planning integrated (FOJT, ISS, STEP) training programs could benefit from careful study of the system in the Air Force.

The Army's Training Extension Course (TEC) program is a very good example of the design, development, and implementation of STEPs under a wide variety of curcumstances. These lessons used in the TEC program cover a wide range of DOS and topics within DOS. They are in audiovisual, audio only, and printed formats, depending on the requirements of the content and the intended use in the field.

Large scale ISS training for critical tasks may be best exemplified by the Navy's fleet training program for new antisubmarine warfare (ASW) pilots. This program utilizes state-of-the-art computer, simulator, and related technologies to provide introductory training for a new weapon system.

While there are many other notable examples of well-managed, exemplary programs, these can serve as a point of departure in those instances where the problems faced by the developer are similar in nature. Often, people who work in those programs are familiar with other similar approaches used elsewhere and can provide valuable information for further search.

3.0 OUTPUTS

The outputs of this block should be:

3.1 Products

1. Documentation of media selected for each learning objective or group of learning objectives (partial example, pages 144-145).
2. A System Master Plan which provides details of system decisions on how the instruction will be developed and implemented
    a. Instructional management plan (See example, page 146.)
    b. Plan for developing instruction, and
    c. Plan for evaluating the system

3.2 Other Documentation

1. Rationale for media selection decisions and management plan decisions
2. A summary statement of rationale for major decisions in the System Master Plan

EXAMPLES

Media selection for "remove main drive shaft from OH-58 Helicopter:"

#9

Learning Category : Recalling procedures and positioning movement

Learning Activity	Guide line
1. State learning activity	1
2. Present each skill separately	2
3. Provide visual demonstration	4
4. Provide checklist and schematics	6
5. Practice	10
6. Provide KOR	11
7. Practice until job standards are reached	20

Media Selection Criteria	✓
COMPLEXITY CRITERIA	
Difficult Motor Acts	
Smooth Motor Performance at end of Training	✓
STIMULUS CRITERIA	
Visual Form	
Alphanumeric	✓
Pictorial, Plane	
Line Construction, Plane	
Object, Solid	
Full visual environment	
Visual Movement	
Still	
Limited	
Full	
Visual Spectrum	
Black and White	
Gray Scale	
Color	
Scale	
Exact Scale	
Audio	
Voice Sound Range	
Full Sound Range	
Ambient Sounds	
Other	
Tactile Cues	
Internal Stimulus Motion Cues	✓
External Stimulus Motion Cues	
Fine movement manipulative Acts	
Broad Movement manipulative Acts	
TRAINING SETTING CRITERIA	
Individual Trainee or team training at a Fixed Location	✓
Individual Trainees with simultaneous instruction or many locations	
Individual Trainee or team training with Independent Instruction at any Location	
Individual Trainee on-the-job	
Small Group	
Large Group at Single Location	
Team Setting	
ADMINISTRATIVE CRITERIA	
Site of Courseware Development	
Local	
Central	✓
Magnitude of Acquisition Cost	
Low	✓
High	

Media Pool

Operational system in lab with tutor.

Simulator with tutor.

Procedure trainer.

Lab carrel with equipment.

Operational system in real environment with tutor.

Media Selection and Rationale:

All acquisition costs are high so the least expensive of the above should be chosen. The operational system in real environment with tutor should be used with some print adjunctive materials. If a higher acquisition cost alternative is permitted, the simulator with tutor and tests is the preferred choice.

SUB-CATEGORY 9

RECALLING PROCEDURES AND POSITIONING MOVEMENT

Directions:

To choose a delivery system:

1. Place a "✓" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "✓". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems											
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm								Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm			
		Operational System in Laboratory with Tutor	Simulator with Tutor and Tests	Procedures Trainer with Tutor and Tests	Logic Trainer with Tutor	CAI with Photo or Operable Mockup	Teaching Machine with Photo or Operable Mockup	Microfiche w/wo Photo or Operable Mockup	Programmed Text - Branching	Laboratory Carrel with Equipment and Linear Instructional Materials	Operational System in Real Environment with Tutor	Texts, Lectures and Demonstrations	
Complexity Criteria													
● Difficult Motor Acts		X	X	X	X					X	X		
● Smooth Motor Performance at End of Training	✓	X	X	X						X	X		
Stimulus Criteria													
● Visual Form													
Alpha-Numeric	✓	X	X	X	X	X	X	X	X	X		X	
Pictorial, Plane					X	X	X	X	X	X		X	
Object, Solid		X	X	X	X					X	X	X	
● Visual Movement													
Still					X	X	X	X	X	X		X	
Full Movement		X	X	X	X	X				X	X		
● Audio													
Voice Sound Range		X	X	X		X				X	X	X	
Full Sound Range		X	X	X						X	X		
Ambient Sounds		X	X	X							X		
● Other													
Tactile Cues		X	X	X						X	X		
Internal Stimulus Motion Cues		X	X	X						X	X		
Training Setting Criteria													
● Individual Trainee at Fixed Location	✓	X	X	X	X	X	X	X	X	X	X	X	
● Individual Trainee with Independent Instruction at Any Location								X	X				
● Small Group					X							X	
● Large Group at Single Location												X	
● Team Setting		X	X	X	X						X		
Administrative Criteria													
● Site of Courseware and Special Hardware Development													
Local								X	X	X	X	X	
Central	✓	X	X	X	X	X	X	X	X	X	X		
● Magnitude of Acquisition Cost													
Low	✓							X	X	X		X	
High		X	X	X	X	X	X			X	X		

TRAINING EXTENSION COURSE MANAGEMENT INSTRUCTIONS

PAGE

CHAPTER 1. GENERAL INSTRUCTIONS

Soldier 3

Instructor 5

Training Manager 6

Commander 7

CHAPTER 2. MANAGEMENT INSTRUCTIONS

TEC Units 9

Training Aids Service Office/Audiovisual Support Center 10

National Guard Maintenance 13

Appendix A. TEC Lesson Basis of Issue 15

B. TEC Audiovisual Equipment Basis of Issue 16

C. TEC Lesson Storage Cabinet 17

D. DA Form 4125 18

E. DA Form 2062 19

CHAPTER 1

TEC GENERAL INSTRUCTIONS

FOR THE SOLDIER

This section is designed to help you use the **TEC** material. We have tried to give you all the information you need to get the most from **TEC**. Use the following list as a guide to answer your questions. For more information contact your supervisor or unit training NCO.

- **WHAT IS TEC?**
- **WHOM IS TEC FOR?**
- **HOW TEC WORKS?**
- **WHY YOU SHOULD USE TEC**
- **HOW TO GET STARTED**

WHAT IS TEC?

TEC is a series of presentations designed to help you do your job.

The first series (TEC I) was a limited production program produced in 1972, for the 11B40 MOS. It is no longer in production, but because of its success, TEC has been enlarged to provide lessons for other MOSs.

The thing that makes **TEC** different is that the lessons have been tested on other soldiers to insure that they teach. **TEC** was developed to make it easier for you to learn what you need to know and what you should be able to do in the performance of your job.

WHOM IS TEC FOR?

The **Training Extension Course (TEC II)** series contains information for–

- all soldiers. These are called common subjects.
- soldiers in the four combat arms branches (Infantry, Armor, Field Artillery, and Air Defense). These are called branch subjects.
- soldiers in eight military occupational specialties (11B, 11C, 11D, 11E, 13A/B, 13E, 16R, 16P). These are MOS subjects.

The TEC III series contains information for–

- soldiers in five critical duty positions–

  Unit Clerk
  PLL Clerk
  TAMMS Clerk
  Generator Operator
  Radio-Teletypewriter Operator

The TEC IV series is a continuation of TEC II & III, and adds the remaining TRADOC service schools to the program to develop lessons for combat support and combat service support battalions. TEC IV lessons will be fielded in FY 77.

HOW TEC WORKS

TEC material will be presented in any one, or a combination, of three ways; audiovisually (like a movie), audio-only (like a radio), or printed (like a book).

You can use **TEC** by yourself (at your own speed) or with several of your buddies.

With **TEC**, you study only the lessons you need. A test helps you find out if you need the information presented on a particular subject. If you can pass the test, then you don't need to take the lesson; however, you are free to use the lesson anytime as a review of previous instruction.

WHY YOU SHOULD USE TEC AND WHEN

The **TEC** series helps you in the following ways:

- **TEC** provides standardized instruction.
- **TEC** saves time. You get the most information in the least time.
- **TEC** teaches what you need-to-know. It helps you prepare for your Skill Qualification Test (SQT).
- **TEC** prepares you to do your job better or learn new job skills which increases your chances for promotion.

When to use **TEC**

- Prior to your Skill Qualification Test (SQT).
- On your own time
- When assigned to a new job

HOW TO GET STARTED

Lesson Catalog–The start point for **TEC** is the Lesson Catalog. Chapter 2 of the catalog gives the objectives of each TEC lesson. A copy of the TEC Lesson Catalog is in your unit and at TEC Learning Centers.

Lesson Administrative Instructions–The Lesson Administrative Instruction is a brief outline that gives you the objectives of the lesson, skills you should already have prior to taking the lesson, and a test to let you decide if you need to take the lesson. It tells how the lesson is presented (e.g., audiovisual, audio-only, programmed text), and additional equipment or materials required. A copy of the Lesson Administrative Instruction Book is in your unit and at TEC Learning Centers.

Student Instruction Sheet–This is an abbreviated Lesson Administrative Instruction. It is inside the box of each audiovisual and audio-only lesson, and is also in the programmed text lessons. It is a quick reference to a lesson's training objectives, materials needed, and time required to take the lesson.

Cue/See Projector–This projector is used for audiovisual lessons. In most cases Cue/See projectors will be located at your unit's Learning Center. Your training NCO can give you information on where your unit's Cue/See projectors and **TEC** lesson library are located. Learning Center personnel will show you how to operate the projector. Or, you may take the "Introduction to TEC" lesson, which teaches you how to operate the projector and tells you more about **TEC**.

Tape Player–The portable cassette tape player is used for audio-only lessons. The audio-only lessons are designed to provide "step-by-step" instructions as you work on equipment (e.g., a vehicle). Your training NCO and unit Learning Center personnel can tell you where the tape players and audio-only lessons are kept, and how you can get them.

Programmed Text–Some TEC lessons will be presented in a book. These programmed texts are available at your unit or at TEC Learning Centers just like audiovisual and audio-only lessons. In some cases these lessons will be formated as job aids. They will actually provide a simplified checklist to pace a man through his job.

The thing to do now is to decide which TEC lesson you want, or need to take. Head for your unit's TEC Learning Center and give TEC a try.

FOR THE INSTRUCTOR

Although the **Training Extension Course (TEC) System** was designed to be used by the individual soldier at his own pace, it can also be used in the small group mode. This section applies to anyone who plans to adapt **TEC** lessons to the group mode.

- **THE TEC INSTRUCTOR**
- **WHY USE TEC**
- **HOW TO ADAPT TEC TO YOUR SITUATION**

THE TEC INSTRUCTOR

TEC places you in a new role. You no longer just present information to a group of soldiers. You are a manager of learning, a resource to the soldier, a counselor. Working on a more personal, individualized basis, you will help the soldier broaden his skills and understanding, take steps to bring his performance up to a standard, and recommend improvements in the instructional system. In order to achieve these objectives, one fundamental of the **TEC** series must be understood. Each soldier must demonstrate mastery of the skills presented. In other words, soldiers are not being compared with each other, but with the standards identified in the **TEC** lesson. Tests, found in the LAIs, have been designed to assure both you and the soldier that he has reached the objectives of the lesson.

As you know, not all soldiers learn at the same rate. Some soldiers will need to go over a lesson several times to reach the objectives and standards stated; other soldiers might feel competent and request to take the test prior to studying the lesson. If they can pass the test, they should not take the lesson, but move on to another one. In the event a soldier fails the test and does not perform satisfactorily after retaking the lesson several times, you should identify the specific items which are causing him to fail and make direct supervision available to him. But, what about the soldier who finished early? What can be done to maintain his motivation and interest? If his reward for finishing early is the assignment of another lesson or an unpleasant detail, he may never finish the second lesson. You should determine a soldier's preferred activities (work, play, entertainment). Then upon his completion of an assignment allow a fixed amount of time for him to enjoy this preferred activity. This is an effective motivation-controlling procedure that works well with all levels of soldiers and, in addition, is useful in controlling the behavior of less motivated soldiers.

WHY USE TEC?

TEC provides you with up-to-date, standardized instructional material which has been tested to insure the stated objectives can be achieved.

TEC assures on-the-job performance. By passing a TEC lesson test, the soldier proves he can do that portion of his job.

TEC assists you by eliminating much of the research requirement for class preparation. This savings in time can be directed toward personalizing your instruction.

TEC teaches skills that are critical to the job or MOS and will help soldiers prepare for the SQT.

HOW TO ADAPT TEC TO YOUR SITUATION

The steps to follow in using TEC lessons in the group mode are:

- Check the Lesson Catalog to determine what lessons are available that apply to your unit's training.
- Arrange for the lesson and necessary equipment. Equipment requirements are found in the Lesson Administrative Instructions.

- Take the TEC lesson yourself prior to presenting it in the group mode.
- Pretest your soldiers. After introducing the lesson and its objectives, give the test. Soldiers that pass the test do not need the lesson.
- Pace the lesson to allow slower soldiers to complete exercises during programmed stops.
- Test soldiers again at the completion of the lesson to insure learning has occurred. Those who have not learned the objectives should repeat the lesson.

In some cases additional practice exercises will be required to insure that your soldiers can perform tasks presented in the TEC lessons. These are called *"skill practice"*. Skill practice exercises are available for some lessons to assist you in adapting the information presented in the lesson to a *"hands on"* practice situation. Setting up this follow-on training is your responsibility. The Lesson Administrative Instructions help you accomplish this by either referring to existing exercises contained in other training material, e.g., Army Subject Schedules, or providing the skill practice as an inclosure.

FOR THE UNIT TRAINING MANAGER

Training managers are responsible for the planning, organization, conduct, and evaluation of training. If you are the Commander, S-3, Platoon Leader, Platoon Sergeant, or Squad Leader, at some point from the planning phase through its implementation, *you* will play an important part in the management of your unit's training.

- **WHY YOUR UNIT SHOULD USE TEC**
- **HOW TO GET THE MOST OUT OF TEC**
- **YOUR RESPONSIBILITIES IN IMPLEMENTING TEC**

WHY YOUR UNIT SHOULD USE TEC

The increased individual proficiency resulting from the use of TEC will improve unit proficiency. TEC will also increase the soldier's technical proficiency, resulting in better job performance and higher SQT scores.

Because TEC is standardized instructional material (in a media the individual soldier can use at his own pace), you will be able to direct more attention to unit (collective) training, while at the same time conduct effective individual training. For example, TEC allows you to single out squad-size elements from other training. Then, using TEC, the squad leader can develop the individual proficiency of his squad members to the required standards.

HOW TO GET THE MOST OUT OF TEC

As a training manager, your responsibilities include the appropriate use of resources to achieve a higher level of effectiveness or a higher level of efficiency, or both. The following are guides to assist you in the use of TEC and help you achieve your training goals.

- Insure that TEC is understood throughout your unit. Emphasize that TEC is a systematically developed, tested, training program.
- Build TEC into your training program (i.e., select and schedule TEC lessons for the individual proficiencies which relate to the current unit training mission).
- Publicize individual proficiency goals and use TEC to train to the required standards.
- Schedule TEC with field exercises as concurrent training. Use as make-up and inclement weather classes.
- Encourage the use of TEC to assist personnel in preparing for upcoming Skill Qualification Tests (SQT).
- Make TEC available during duty and non-duty hours.

- Recognize and reward individuals who use **TEC**.
- Do not fill a classroom with soldiers and attempt to use **TEC** as you would a training film. Remember that **TEC** lessons require each soldier's active participation and were designed to be used by an individual or adapted to a small group.

YOUR RESPONSIBILITIES IN IMPLEMENTING TEC

As a training manager, *you have the responsibility* of insuring that the program functions properly.

- You must supervise the use of **TEC** equipment. For example, if equipment is taken from the Learning Center for a platoon class, insure that it doesn't end up locked in a supply room for several days, thereby limiting its use.
- Insure security of all **TEC** materials.
- Insure completion of necessary forms and records.
- Schedule locations for group mode presentations. This is especially important in assisting soldiers preparing for Skill Qualification Tests (SQT).
- Schedule tests to assist in determining the level of training in your unit and to identify individuals that would benefit from **TEC** training.
- Schedule activities and rewards for those personnel who do not need training or who complete the **TEC** training early.

FOR THE COMMANDER

Leadership is the basic requirement for the innovation and continuance of the TEC program in your unit. Without your support, TEC will fail.

- **DIVISION COMMANDER**
- **BRIGADE COMMANDER**
- **BATTALION/SQUADRON COMMANDER**
- **COMPANY/BATTERY/TROOP COMMANDER**

ABOUT TEC

TEC is more than transporting instruction from Army service schools to individual soldiers at the unit level via multimedia methods. It focuses on the application of instructional technology to all types of Army training.

TEC training materials have been designed to emphasize performance. The utilization of *"tests"* and *"skill practices"* as a part of the **TEC** program is in step with the Army's move toward performance oriented training. Most important, these materials have been tested, actually *"tried out"* on soldiers from the target population to insure that they teach. This validation process is one of the most important differences between the **TEC** program and conventional instruction.

Your commanders and trainers can use the **TEC** lesson tests as a diagnostic vehicle to determine strengths and weaknesses in the job proficiency of individual soldiers. A prescriptive approach to training can then be taken and you will be able to profile the individual proficiency strengths and weaknesses of your unit as a whole.

The **TEC** training materials and equipment provide the nucleus for a unit Learning Center. This center can be a composite of military training materials, GED materials, and commercially produced materials related to soldier needs and interests.

TEC provides instructors standardized material in a ready-to-use form adaptable to their needs. The instructor thus will have more time available to concentrate on training rather than researching and preparing platform presentations.

This is not to imply that **TEC** is the answer to all of your training problems. But, **TEC** does give you another means of improving an individual's proficiency when integrated into your training program. Its use and effectivenss will be limited only by the imagination of your trainers.

CHAPTER 2

TEC MANAGEMENT INSTRUCTIONS

TEC UNITS

This section outlines the receipt and maintenance procedures to be followed in units issued the **TEC** series. In some cases the procedures for Active Army, USAR, and National Guard units will differ; these differences will be noted.

- **RECEIPT OF TEC LESSONS**
- **SUPPORT MATERIALS**
- **RECEIPT OF TEC AUDIOVISUAL EQUIPMENT**
- **PREVENTIVE MAINTENANCE**
- **ORGANIZATIONAL MAINTENANCE**

SUPPORT MATERIALS

Several items have been prepared to assist units in the effective and efficient use of TEC.

The **TEC Lesson Catalog, TC 21-5-4,** lists all the lessons currently available in the **TEC** program. Chapter 2 of the catalog provides a synopsis of the training objectives for each lesson to assist in selecting lessons for use in accomplishing specific training tasks. The catalog will be distributed down to company-sized units. Initially, it will be produced in a looseleaf format to facilitate updating, which will be required due to the rapid increase in the number of **TEC** lessons to be fielded during FY 76.

The **Lesson Administrative Instructions (LAI)** provide the following information for each lesson: training objectives, pretraining actions, lesson materials, equipment and/or materials required, length, study reference, skill practice, and recommendations to instructors. These will be distributed down to company-sized units. To assist units in maintaining [illegible]rate files of LAIs, a three-ring binder is also provided. However, the unit will have to supply additional binders as their lesson inventory increases. **TEC** suggests that LAIs be organized and filed in the binders in the same manner as Chapter 2 of the TEC Lesson Catalog, TC 21-5-4.

Adjunctive Material is required to support some lessons. The initial issue of materials will accompany the **TEC** lesson they support to the field. Instructions are provided in the LAI for each lesson which requires adjunctive materials, informing the unit on how to procure replacement adjunctive materials for those expended during the course of lesson usage.

Projection Screens are issued to support the use of the Cue/See Projector in the small group mode. The BOI is one screen per company.

To facilitate control and easy access to **TEC** lessons, **Lesson Storage Cabinets** are needed. Appendix C shows plans for a lesson storage cabinet easily made by modifying a footlocker. One advantage of this type of storage container is its mobility. With it the unit's **TEC** lesson library can be easily transported to the field.

Whatever is used to store **TEC** lessons, **TEC** suggests that lessons be filed according to Chapter 2 of the TEC Lesson Catalog, TC 21-5-4.

RECEIPT OF TEC LESSONS

The basis of issue for **TEC** lessons is given in appendix A. The initial distribution of a lesson will be made directly to units by the TRADOC Training Aids Management Agency, Training Material Support Division, Tobyhanna, PA 18466.

Under special conditions, some units may require additional copies of a **TEC** lesson. In those cases, adjustments in the basis of issue for the units will be made upon review and approval of the demand data. To initiate this action, the unit submits requests for additional copies of a lesson to the Training Material Support Division, ATTN: ATTNG-TA-P. The unit's supporting TASO/AVSC will assist in preparing and submitting the order. DA Form 4125, Permanent Retention Film Order (replaces DA Form 11-172) will be used to submit the request. See appendix D, page 18. The film order will be addressed from the supporting TASO/AVSC to the Training Material Support Division. The "ship to" block will contain the requesting unit's address.

Damaged film cartridges and tape cassettes will be replaced on a direct exchange basis by the supporting TASO/AVSC.

Units can ascertain the completeness of their lesson inventory by checking the TEC Lesson Catalog (TC 21-5-4).

RECEIPT OF TEC AUDIOVISUAL EQUIPMENT

The BOI for the Cue/See Projector and Portable Cassette Tape Player is given in appendix B.

CONUS units, Active Army and USAR, will receive TEC audiovisual equipment from their supporting TASO. OCONUS units will receive TEC audiovisual equipment from their supporting Audiovisual Support Center (AVSC). National Guard units may receive TEC audiovisual equipment from their state USP&FO or from their supporting TASO/AVSC. This will depend on each state's TEC implementation plan and the arrangements made with the supporting TASO/AVSC.

It is suggested that receipt procedures be in accordance with AR 710-2 and that DA Form 2062 (see appendix E, page 19) be used to record the equipment issue.

PREVENTIVE MAINTENANCE

Preventive maintenance is the systematic care, inspection and servicing of equipment to keep it in serviceable condition, prevent breakdowns, and insure maximum operational readiness.

Only personnel assigned to the unit's Learning Center will perform preventive maintenance on TEC equipment. Learning Center personnel will prepare equipment for operation on a daily basis. Students will not perform this function.

Learning Center personnel will follow the maintenance procedures provided in the equipment operating instructions to insure the proper use and maintenance of TEC audiovisual equipment. Preventive maintenance is limited to those activities listed in the operating instructions for each type of equipment.

A DA Form 2404, Equipment Inspection and Maintenance Worksheet, will be used to record equipment inspections and checkouts for each system. Only those shortcomings and deficiencies which cannot be corrected or which are corrected by replacement of parts will be recorded on the form. Equipment with uncorrected shortcomings and deficiencies will be evacuated to the supporting TASO/AVSC for maintenance support.

ORGANIZATIONAL MAINTENANCE

Active Army units and, when feasible, US Army Reserve units will deliver inoperative equipment to their supporting TASO/AVSC for repair. If the TASO/AVSC can repair an item on the spot, the same item will be returned to the unit. If on-the-spot repair is not possible, an operational item from maintenance float will be exchanged for the defective item. The DA Form 2404 will accompany the equipment and be used by the TASO/AVSC.

US Army Reserve units, that cannot deliver the inoperative equipment to their TASO/AVSC, may ship it. The DA Form 2404 will accompany each item shipped.

National Guard units will evacuate inoperative TEC equipment in accordance with their state's TEC maintenance support plan. The DA Form 2404 will accompany the equipment.

OCONUS units will deliver or ship inoperative equipment, along with DA Form 2404, to their supporting AVSC for repair.

TRAINING AIDS SERVICE OFFICE (TASO)/AUDIOVISUAL SUPPORT CENTER (AVSC)

This section provides guidance to the TASO/AVSC for establishing policies and operating procedures for control and maintenance of TEC equipment and supplies.

- **RECEIPT AND ISSUE OF TEC LESSONS**
- **RECEIPT OF TEC AUDIOVISUAL EQUIPMENT**
- **ISSUE OF TEC AUDIOVISUAL EQUIPMENT**
- **PREVENTIVE MAINTENANCE**
- **ORGANIZATIONAL MAINTENANCE**
- **DIRECT SUPPORT/GENERAL SUPPORT MAINTENANCE**

RECEIPT AND ISSUE OF TEC LESSONS

The TRADOC Training Aids Management Agency, Training Support Division will make the initial distribution of lessons to units. They will provide the TASO/AVSC with a copy of the shipping document of the lessons issued to its supported units. This listing will serve as the TASO/AVSC's issue confirmation document and as their checklist to control TEC lessons.

After units develop demand experience for TEC lessons, there may be requirements to make adjustments in the number of lessons issued to a unit. The unit will submit its request for additional copies of a lesson to its supporting TASO/AVSC (DA Form 4125). See appendix D, page 18. The TASO/AVSC will assist the unit in preparation of the order and forward the request to the Training Support Division, ATTN: ATTNG-TA-P, for approval. Upon approval, the lesson will be shipped directly to the requesting unit with a copy of the shipping document to the TASO/AVSC for control purposes.

The TASO/AVSC will receive a limited number of each TEC lesson to use in replacing those unit copies that become defective. The TASO/AVSC should maintain a minimum of two copies of each lesson in stock by reordering copies from the Training Aids Management Agency, Training Support Division. DA Form 4125 will be used to order these lessons. See appendix D, page 18. The "ship to" block will contain the TASO/AVSC's address.

The Training Support Division will notify the TASO/AVSC when lessons become obsolete. The TASO/AVSC will inform the supported Active Army and Reserve Components units to turn in the obsolete lessons. The TASO/AVSC will dispose of obsolete or damaged cartridges and cassettes in accordance with AR 108-5.

RECEIPT OF TEC AUDIOVISUAL EQUIPMENT

Upon receipt of TEC audiovisual equipment from the Installation Accountable Officer the TASO/AVSC will inspect it for completeness and serviceability.

The TASO/AVSC will prepare the equipment for distribution in accordance with the instructions provided by the US Army Combat Arms Training Board, Fort Benning, Georgia 31905.

The TASO/AVSC will also receive additional TEC audiovisual equipment to be maintained at the TASO/AVSC as a maintenance float. Generally this will be calculated on the basis of 10% of the equipment issued to supported units.

ISSUE OF TEC AUDIOVISUAL EQUIPMENT

It is recommended the procedures in AR 710-2 be followed for issue of the Cue/See Projector and the Portable Cassette Tape Player.

It is suggested the TASO/AVSC utilize DA Form 2062 (see appendix E, page 19) to issue **TEC** audiovisual equipment to Active Army and USAR units; and also for the National Guard whether it is issued to the units or to each state's United States Property and Fiscal Officer.

The basis of issue for **TEC** audiovisual equipment is established in appendix B. The TASO/AVSC will not loan, on an indefinite or extended loan, additional hardware to, or recall hardware from, units without approval of the supported major unit commander.

PREVENTIVE MAINTENANCE

The TASO/AVSC will schedule and record maintenance services for **TEC** audiovisual equipment. Maintenance services are stated in the Technical Service Manual for the cassette tape player and the Maintenance and Service Manual for the Cue/See projector.

TEC audiovisual equipment in Active Army, USAR and National Guard units will be scheduled for maintenance services semi-annually. The TASO/AVSC or state Maintenance Officer will notify the units of equipment scheduled for maintenance services by serial number.

Maintenance services for audiovisual equipment in the TASO/AVSC maintenance float will be performed quarterly.

ORGANIZATIONAL MAINTENANCE

The TASO/AVSC is responsible for organizational maintenance of **TEC** audiovisual equipment. Maintenance guidance is contained in the Technical Service Manual for the cassette tape player and the Maintenance and Service Manual for the Cue/See projector.

Active Army units and US Army Reserve units will deliver inoperative equipment to their supporting TASO/AVSC for repair. If the TASO/AVSC can repair an item on-the-spot, the same item will be returned to the unit. If on-the-spot repair is not possible, an operational item from maintenance float will be exchanged for the defective item.

US Army Reserve units unable to deliver equipment to the supporting TASO/AVSC may ship the inoperative equipment to the TASO/AVSC. The DA Form 2404 will accompany each item shipped. If the TASO/AVSC can repair the defective item within 24 hours, it will be returned to the unit. If the TASO/AVSC cannot repair the item within 24 hours, an operational item from maintenance float will be shipped to the unit to replace the defective item.

National Guard **TEC** equipment beyond the repair capabilities of the state combined support maintenance shop will be shipped or delivered to the TASO/AVSC. The TASO/AVSC will issue an operational item from maintenance float to replace the item turned-in.

After equipment is repaired at the TASO/AVSC it will be placed in the maintenance float.

A one-time issue of repair parts kits for the Cue/See projector will be made to the TASO/AVSC on the basis of one kit per ten machines.

The TASO/AVSC can obtain repair parts for all **TEC** audiovisual equipment by requesting the Purchasing and Contracting Office to submit purchase orders according to the Basic Ordering Agreements which have been negotiated with the equipment manufacturers of the **TEC** audiovisual equipment. Distribution of the Basic Ordering Agreements is to the TASO/AVSC. The TASO/AVSC will distribute copies of the Basic Ordering Agreements to his supporting Purchasing and Contracting Office and installation consolidated maintenance facility. Further information can be obtained by contacting the US Army Combat Arms Training Board, Fort Benning, Georgia 31905, (AV 835-5277).

Equipment beyond the repair capability of the TASO/AVSC will be sent to the supporting combined maintenance facility, or the manufacturer (per the Basic Ordering Agreement). The exercise of this option is at the discretion of the TASO/AVSC and is dependent on the availability and responsiveness of DS/GS support from the combined maintenance facility.

DIRECT SUPPORT/GENERAL SUPPORT MAINTENANCE

TEC audiovisual equipment requiring maintenance beyond organizational level, or beyond the capability of the TASO/AVSC, will be handled in the following manner.

The TASO/AVSC will evacuate inoperative items still under maintenance warranty to the manufacturer's maintenance facility. Warranty information can be obtained by contacting the US Army Combat Arms Training Board, Fort Benning, Georgia, (AV 835-5277).

TEC audiovisual equipment for which the warranty is no longer in effect will be evacuated to the Class I installation consolidated maintenance facility.

If the maintenance facility is not capable of repairing an item, the inoperative equipment will be evacuated to the manufacturer's designated maintenance facility in the following manner.

- The installation consolidated maintenance facility must request contract maintenance support through the Purchasing and Contracting Office.
- The Purchasing and Contracting Officer will prepare a purchase order according to the terms of the basic ordering agreement.
- The inoperative item and the purchase order will be shipped to the manufacturer's designated maintenance facility.
- The manufacturer's maintenance facility repairs the item and returns it to the installation.

TEC audiovisual equipment determined to be uneconomically repairable will be returned to the TASO/AVSC. The TASO/AVSC will notify the US Army Combat Arms Training Board of the failure and request replacement for the equipment. The TASO/AVSC will follow local procedures for turn-in of the equipment to the Property Disposal Office.

NATIONAL GUARD MAINTENANCE

This section serves as a guide for the State Maintenance Officer in establishing policies and operating procedures relative to the maintenance of **TEC** audiovisual equipment.

- **MAINTENANCE/SUPPORT STRUCTURE**
- **PREVENTIVE MAINTENANCE**
- **ORGANIZATIONAL MAINTENANCE**

MAINTENANCE/SUPPORT STRUCTURE

It is recognized that the support capabilities of the organizational maintenance shops within a given state will vary. Some organizational maintenance shops will be able to perform the prescribed maintenance on **TEC** audiovisual equipment; others will not. In some states it may be necessary to perform all **TEC** equipment organizational maintenance at the Combined Support Maintenance Shop. Because of this variance, specific maintenance procedures applicable to all states cannot be prescribed.

The State Maintenance Officer, after careful consideration of his state's maintenance capabilities, will designate which facilities will play an active role in the maintenance of **TEC** audiovisual equipment. We do recommend that all organizational maintenance shops be part of the support structure to expedite movement of

TEC equipment to and from the units. The primary consideration should be to free the units from as many of the maintenance responsibilities as possible.

PREVENTIVE MAINTENANCE

The Organizational Maintenance Shops/Combined Support Maintenance Shop will perform scheduled preventive maintenance services on **TEC** equipment. **TEC** equipment will be scheduled for organizational preventive maintenance service semi-annually.

Organizational preventive maintenance for audiovisual equipment in maintenance float will be performed quarterly.

When feasible, it is recommended that organizational preventive maintenance be accomplished at the unit by preventive maintenance teams from the Organizational Maintenance Shops/Combined Support Maintenance Shop.

ORGANIZATIONAL MAINTENANCE

The State Maintenance Officer is responsible for organizational maintenance of **TEC** audiovisual equipment issued to the National Guard.

In planning for maintenance support of **TEC** audiovisual equipment, the State Maintenance Officer will want to locate the maintenance float to insure responsiveness to the supported units. This can be done by placing the maintenance float at the stated Combined Support Maintenance Shop, or due to unit locations and the factors of time and distance may require positioning float equipment at several organizational maintenance shops. This type of arrangement will increase control problems in management of the float equipment, but will increase responsiveness to the units.

National Guard units may evacuate inoperative equipment to the Organizational Maintenance Shop. The DA Form 2404 will accompany each item. If the OMS can repair the item on the spot, it will be returned to the unit. If the OMS cannot repair the item on the spot, they will request an operational item from maintenance float be exchanged for the defective item, and deliver it to the unit.

An item of equipment beyond the repair capability of the OMS will be forwarded to the state Combined Support Maintenance Shop. If the state CSMS cannot repair the item, it will be forwarded to the supporting TASO.

APPENDIX A

TEC LESSON BASIS OF ISSUE

TYPE UNIT	NUMBER OF LESSONS BY TYPE			
	COMMON	BRANCH	MOS	CRITICAL DUTY POSITION
Active Army Combat Arms Battalion	1	1	1	1
Reserve Components Combat Arms Battalion	2	2*	2*	1
USAR School	2	2*	2*	2
USAR Training Division	4	4*	4*	4

**Air Defense Artillery lessons are not issued.*

TEC II

Common Lessons Lessons applicable to all soldiers.

Branch Lessons Lessons applicable to soldiers in the four combat arms branches (Infantry, Armor, Field Artillery, and Air Defense).

Military Occupational Speciality (MOS) Lessons Lessons applicable to soldiers in the following MOS: 11B, 11C, 11D, 11E, 13A, 13B, 13E, 16R, 16P.

TEC III

Critical Duty Position Lessons—Lessons applicable to soldiers in the following jobs: Unit Clerk, PLL Clerk, TAMMS Clerk, Generator Operator, and Radio-Teletypewriter Operator.

The projected total is approximately 625 lessons at the completion of the current lesson development program in FY 76. For planning purposes, the following is a breakout of the number of lessons by type:

• **Common**	**200**
• **Infantry Branch & MOS**	**60**
• **Armor Branch & MOS**	**85**
• **Artillery Branch & MOS**	**85**
• **ADA Branch & MOS**	**80**
• **Critical Duty Position**	**115**

NOTE: Cavalry Squadrons will receive both Infantry and Armor Branch and MOS lessons.

As an example, an Active Army Infantry Battalion will receive approximately 375 lessons.

- 1 each of 200 Common lessons
- 1 each of 60 Branch & MOS lessons
- 1 each of 115 Critical Duty Position lessons

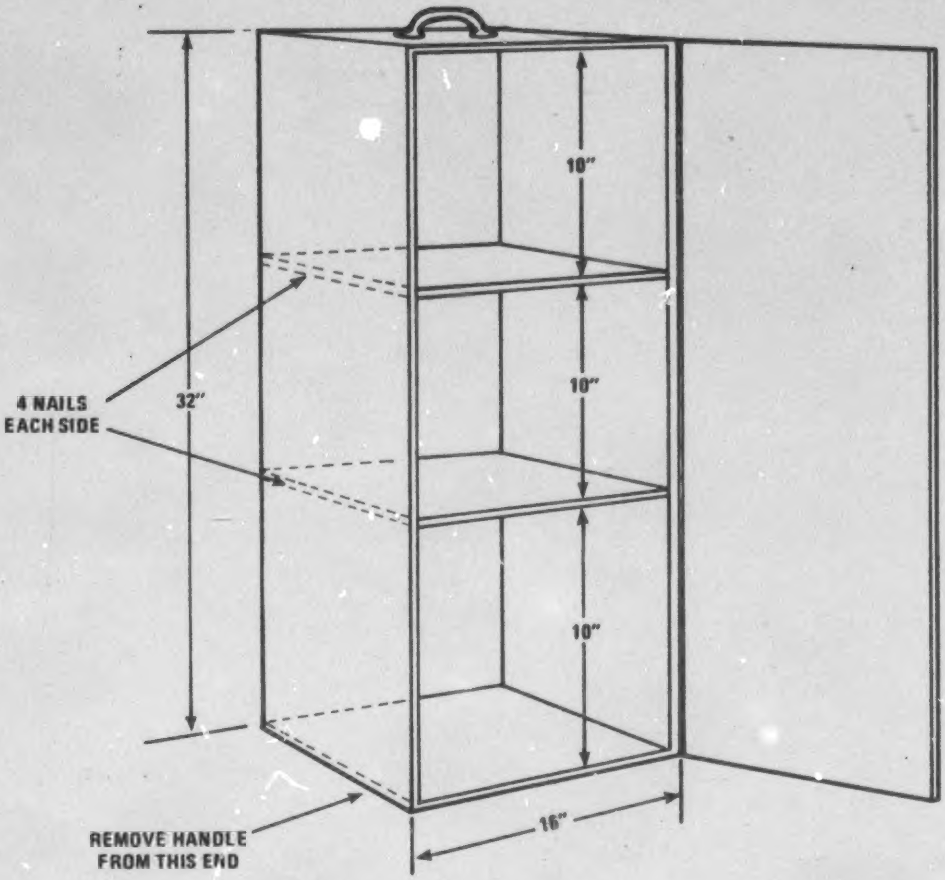
APPENDIX B

TEC AUDIOVISUAL EQUIPMENT BASIS OF ISSUE

TYPE UNIT	NUMBER OF SETS PER UNIT	
	CUE/SEE PROJECTOR	CASSETTE TAPE PLAYER
Active Army Combat Arms Battalion	8	4
Reserve Components Combat Arms Battalion	8	4
USAR Schools	5	1
USAR Training Division	3/Bde	1/Bde

APPENDIX C

TEC LESSON STORAGE CABINET


10"
10"
10"
32"
4 NAILS
EACH SIDE
16"
REMOVE HANDLE
FROM THIS END

APPENDIX A

INSTRUCTIONAL METHODS AND DEVICES

APPENDIX A

INSTRUCTIONAL METHODS AND DEVICES

AUDIO ONLY SYSTEMS

AUDIO DISC PLAYBACK SYSTEM - An audio system that uses a record player and sound recorded on a disc (record) that may be played back upon request by a listener.

AUDIO TAPE SYSTEM - An audio system that uses a tape recorder/reproducer to record sound on magnetic tape that may be played back upon request by a listener. (Reel to reel, cartridge, cassette)

TELEPHONE CONFERENCE SYSTEM - A telephone system with switching matrix capability that allows multiple station two-way audio communication at two or more remote locations.

AUDIO-VISUAL

AUDIO TAPE WITH PRINTED MATERIAL - An audio system that uses a tape recorder/reproducer to record sound on magnetic tape that may be played back upon request. Printed materials such as texts, worksheets, PI, schematics, test materials, etc., used with audio tapes offer a variety of training applications.

CLASSROOM - TRADITIONAL - A classroom designed and equipped for an instructor to lecture, lead group discussions, conduct paper and pencil tests and use instructor controlled audio-vidual aids.

FILMSTRIP PROJECTION SYSTEM WITH AUDIO - A sound filmstrip projector represents a family of audio-visual devices using single frame visual filmstrips with sound on magnetic tape or records. Visuals and sound may be manually or automatically synchronized, or be completely independent of one another. Commercial equipment options include front or rear screen projection, remote and stop action capability, and cartridge loading models.

FILMSTRIP PROJECTION SYSTEM WITH AUDIO AND ADJUNCT EQUIPMENT - A system for presenting information via a filmstrip projector and synchronized audio tape or film sound track. The use of adjunct equipment with the AV media provides the capability for a variety of "hands-on" training tasks to be performed.

MOTION PICTURE PROJECTION SYSTEM - COMMERCIAL, 16MM and SUPER 8MM FILMS - A motion picture projection system implying the use of professionally prepared commercial 16mm or S-8mm sound motion picture films for training. Appropriate 16mm or S-8mm projector and projection screen are included.

MOTION PICTURE PROJECTION SYSTEM - LOW BUDGET 16MM AND SUPER 8MM FILMS - A motion picture projection system implying the use of locally produced sound motion picture films for training. Such films are acceptable for training, but often lack the professional quality of commercial films. Appropriate 16mm or S-8mm projector and projection screen are included.

MICROFORM WITH INFORMATION MAPPING, AND AUDIO - The theoretical configuration of a training system to support individualized instruction composed of microimagery in an information map format, a microform projector, an audio tape in a cassette and an audio cassette playback unit.

INSTRUCTIONAL KIT WITH INSTRUCTOR - A teaching kit designed for specific subject area instructional support. Kit allows the instructor to use a varied or multi-level teaching strategy approach to instruction by including appropriate visual aids, audio tapes, models, charts, demonstrators, reference and test materials.

INSTRUCTIONAL KITS FOR TRAINEES - A modular instructional kit designed for students that contains all materials required for a segment of instruction. Kit may contain programmed instruction, audio visual materials, tools, materials, typical samples, reference materials, and testing materials as appropriate.

OVERHEAD PROJECTION SYSTEM WITH INSTRUCTOR - A system consisting of a horizontal stage projector designed to use a vertical throw for focusing an enlarged transparency image upon a projection screen. An operator is normally required to change the transparency and furnish verbal commentary.

SOUND SLIDE PROJECTION SYSTEM - A system for presenting information by means of an audio tape and a series of synchronized projected visual slides. The use of adjunct equipment allows the system to be used in support of "hands-on" training.

TEACHING MACHINE - BRANCHING, STILL VISUAL WITH AUDIO - An instruction device composed of large step multiple choice programmed instruction frames (still) with synchronized sound and a manually controlled device to select, sequence, and display program frames in an order dependent upon the trainee's last response.

TEACHING MACHINE - BRANCHING, STILL AND MOTION VISUAL WITH AUDIO - An instruction device composed of large step multiple choice programmed instruction frames (still and motion) with synchronized sound and a manually controlled device to select, sequence, and display program frames in an order dependent upon the trainee's last response.

TEACHING MACHINE - BRANCHING, WITH ADJUNCT EQUIPMENT - An instruction device composed of large step multiple choice programmed instruction frames (still or motion with or without audio) with a manually controlled device to select sequence and display program frames in an order dependent upon the trainee's last response. Associated with this equipment is a second piece of equipment, such as a mockup, which is the subject of instruction and is operated according to instructions from the basic teaching machine.

TELECONFERENCE SYSTEM - A telecommunication system that allows audio and visual two-way communication between two or more remote locations.

TELEVISION - CABLE (CATV) - A hybrid CCTV system offering selective, multiple channel, encoded programming to cable network patrons. A typical system consists of a signal receiving antenna system for the master station and relay of amplified signal channels via area substations to system subscribers. Programming may also be generated and transmitted between substations offering multiple options for conference or training. Programs are encoded for privacy and control of viewing audience.

TELEVISION - CLOSED CIRCUIT (CCTV) WITHOUT FEEDBACK - CCTV without feedback is an electronic transmission system for images and sound using a coaxial cable distribution system. System design includes one or more studios or control rooms, a signal distribution center, and signal distribution cables terminating in reception areas equipped with receiver/monitors. Off air, live or video taped programs may be used.

TELEVISION - PORTABLE VIDEO TAPE SYSTEM - A low cost video tape recording and playback system which is self-contained and portable. Typical systems consist of one or two mobile vidicon cameras, a small scan video tape recorder (B&W) and a monitor receiver. Immediate area programming and open broadcast reception and recording is standard.

CARREL - AV EQUIPPED - A small enclosure or alcove incorporating a desk used for individual studies, supplied with audio and visual materials and supporting equipment.

CARREL - LABORATORY - A small enclosure or alcove incorporating a desk, to be used by one or two trainees and equipped with a set of special tools and materials for carrying out a hands-on learning event. It may include audio-visual systems.

COMPUTER ASSISTED INSTRUCTION (CAI) - A form of individualized instruction that employs a digital computer technology to manage and display information to a student, accept student responses, provide knowledge of results, and select subsequent learning events.

COMPUTER ASSISTED INSTRUCTION - PLATO IV BASIC CONFIGURATION - An individualized computer based teaching system being developed by the University of Illinois at Urbana-Champaign, and includes up to 4096 terminals, a communication network, a central computer and the author language TUTOR.

COMPUTER ASSISTED INSTRUCTION - PLATO IV, BASIC CONFIGURATION AND AUDIO - System includes basic configuration of PLATO IV plus a random access audio playback system.

COMPUTER ASSISTED INSTRUCTION - PLATO IV, BASIC CONFIGURATION WITH ADJUNCT EQUIPMENT - Includes the basic terminal with externally connected auxiliary equipment.

COMPUTER ASSISTED INSTRUCTION - PLATO IV BASIC CONFIGURATION WITH ADJUNCT EQUIPMENT AND AUDIO - The basic terminal with externally connected auxiliary equipment includes a random access audio playback system.

COMPUTER MANAGED INSTRUCTION (CMI) - A computer has the required instructional design program. It can receive information about the student behavior from terminals on- or off-line and give him information about his achievement. The design normally gives instructions for changes which are indicated by student response and may drop him to easier exercises or automatically cycle him to a higher response exercise.

CMI - CAI TICCIT - A system designed by Mitre Corporation and programmed by Utah State University which can both manage student instruction and/or provide full instruction.

COMPUTER SIMULATION

COMPUTER SIMULATION - ON-LINE - A trainee station equipped with a computer terminal in which the trainee operates in direct interface with the computer as part of the program loop. By his inputs, the trainee determines his allowable performance parameters and discerns the effect of his inputs upon the system being simulated.

COMPUTER SIMULATION - OFF-LINE - A trainee station equipped with a computer terminal enabling a trainee to select a computer simulation program, enter his own variables (batch processing) and run the simulation to determine the performance of the simulated system under a variety of conditions.

GAME - COMPUTER SIMULATION, SOLITAIRE, WITH VISUAL DISPLAY - Any contest, governed by rules, between a single player and a computer with visual attachments where the contest is a dynamic model of some real world system or event.

OPERATIONAL EQUIPMENT WITH MANUALS - A unit of operational equipment being used for instructional or training purposes with its supporting technical documentation such as operator's guides, maintenance manuals and parts lists. May be an electronic black box, rifle, or truck. Usually associates with individual training leading to team training.

OPERATIONAL SYSTEM - REAL ENVIRONMENT - An operational system used for training such as an aircraft, ship, or track vehicle. Part task, full task, sub-team, team, or multi-team training may be conducted in conjunction with or independent of normal operations. A performance aid is inherent in trainer usage.

OPERATIONAL SYSTEM - SYNTHETICALLY SIMULATED - A device, machine, apparatus, or paper model that synthetically reproduces a condition or conditions of an operational system. It may or may not physically represent the operational system, but will functionally allow an individual or crew to practice operational tasks in accordance with training objectives.

OPERATIONAL SYSTEM - SYNTHETICALLY STIMULATED - An operational system that is used for training by interfacing input equipments in the form of tapes, black boxes, or computers. Such input equipments present programmed data to the operational system allowing it to be used for training or evaluative purposes. May be used for part task, full task, sub-team, multi-team training, or combinations thereof. A performance aid is inherent in trainer usage.

PROCEDURE TRAINER - Training hardware designed for basic training, familiarization or transition type procedure training for normal, alternate, and emergency operation of operational hardware. Trainer systems respond appropriately to trainee inputs but to a lesser degree of fidelity of performance than is required for simulators. May be used for various combinations of part task, full task, sub-team, team, or multi-team training.

PROCEDURE TRAINER - ADJUNCT DISPLAYS AND LOGIC - Training hardware designed for basic training, familiarization, or transition type procedure training for normal, alternate, and emergency operation of operational hardware. Trainer systems respond appropriately to trainee inputs but to a lesser degree of fidelity of performance than is required for simulators. May be used for various combinations of part task, full task, sub-team, team, or multi-team training. Adjunct displays and logics may include scoring attachments, adaptive control, automatic demonstrations, enhanced displays, automated briefing and debriefing capability, automatic coaching, remedial exercise prescriptions or follow-on assignments.

SIMULATOR - Training hardware that is designed specifically for training purposes to simulate operational equipment/systems or portions thereof, and which simulates the operational environment in a training situation. When operated, it becomes a dynamic model of the appearance and performance of selected aspects of the operational equipment/system. May be designed for part task, full task, sub-team, team, multi-team training or combinations thereof.

SIMUALTOR - ADJUNCT DISPLAYS AND LOGIC - Training hardware that is designed specifically for training purposes to simulate operational equipment/systems or portions thereof, and which simulates the operational environment in a training situation. When operated, it becomes a dynamic model of the appearance and performance of selected aspects of the operational equipment/system. May be designed for part task, full task, sub-team, team, multi-team training or combinations thereof. Adjunct displays and logics may include scoring attachments, adaptive control, automatic demonstrations, enhanced displays, automated briefing and debriefing capability, automatic coaching, remedial exercise prescriptions or follow-on assignments.

SPECIMEN SETS - An instructional kit containing samples of similar items, liquids or materials that may be tested or evaluated for identification, quality or type.

PHYSIOLOGICAL TRAINER (HOSTILE ENVIRONMENT)VISUAL - A training device designed to place controlled stress on the human visual system, through the use of physiologically and/or psychologically adverse or low threshold visual signals, to enable a trainee to learn to function in this adverse environment.

PHYSIOLOGICAL TRAINER (HOSTILE ENVIRONMENT) SURFACE AND INTERNAL SENSES - A broad category of training devices designed to provide the cutaneous, kinesthetic, and olfactory sensors with physiologically and/or psychologically adverse signals, to enable a trainee to function in adverse pressure, temperature, pain, or disorientating motion environments.

VISUAL ONLY

FILMSTRIP PROJECTION SYSTEM - A single frame projector or attachment thereto that will accept a filmstrip format and project the film images upon a viewing screen. See: Sound Filmstrip Projection System.

MICROFORM WITH INFORMATION MAPPING - Micro-imagery, such as microfilm, used as a medium of introduction with the additional requirement that each block of information be clearly identified as introduction, overview, test, review questions, index, and other discrete titles, and that each type of information be positioned in a standard location within the medium format.

MICROFORM WITH INFORMATION MAPPING AND ADJUNCT EQUIPMENT - The theoretical configuration of a training system to support individualized instruction composed of microimagery in an information map format, a microform projector, and a piece of auxiliary equipment, such as a mockup, which is the subject of the instruction.

SLIDE PROJECTOR SYSTEM - 2" X 2" - A class of single frame picture projectors that will accept a standard 2" X 2" slide and project the contained image upon a viewing screen.

SIMULATION - PAPER - The representation of selected dynamic characteristics of a system through the use of charts, tables, static photographs, drawings, and lists of performance characteristics under specified conditions. This information is presented in such a way that the trainee can study the initial performance of the system, change inputs to or elements within the system and note changes in the performance of the system.

TEACHING MACHINE - LINEAR, STILL VISUAL - An individualized instruction system composed of a fixed linear sequence of small step programmed instruction frames (still) and a manually controlled device to display the information.

TEACHING MACHINE - BRANCHING, STILL VISUAL - An individualized instruction system composed of large step multiple choice programmed instruction frames (still) and a manually controlled device, to select sequence and display program frames in an order dependent upon the trainee's last response.

PRINT MATERIALS

CASE STUDY FOLDER - A folder of detailed background information on a problem requiring a decision or plan of action; to be read by the trainee prior to his (1) making a decision on how to resolve the issue, and (2) participating in a critique on various solutions. Various forms of folders are used in support of such methods of instruction as the Case Study, Incident and In-Basket methods of management and leadership training.

FLASH CARDS - A set of cards designed to be used by an instructor in front of a group of trainees to drill the group in the recall of memory type information.

PRINTED MATERIALS - HANDOUTS - Handouts are a class of printed materials issued to a student for his use and retention to augment regular instructional materials. They are usually instructor prepared, machine copied materials of one or two pages highlighting specific topics or updating existing materials.

PRINTED MATERIALS - PERFORMANCE AIDS - Performance aids are a class of printed materials that aid in job performance by providing data that should not be committed to memory, such as checklist routines, or is too complex to be committed to memory such as conversion tables, equipment test tolerance matrices, and the like.

PRINTED MATERIALS - REFERENCE BOOKS - Reference books are a class of printed materials used to identify certain facts or for background information such as dictionaries, encyclopedias or technical publications.

PRINTED MATERIALS - REFERENCE CHARTS - Reference charts are a class of printed material pictorially or geographically displaying data used to identify certain facts or for background information. Included are data charts, schematic diagrams, topographical maps, and the like.

PRINTED MATERIALS - SELF SCORING EXERCISES - Self scoring materials include exercises and quizzes used in conjunction with standard curriculum, programmed instruction or independently. The class includes electrographic or mark sense materials scored by keys or computer, punch mark and other mechanical score indicating equipments, chemically scored materials, etc. that have the capability of providing near immediate student feedback without the use of prolonged scoring procedures.

PRINTED MATERIAL - WORKBOOK - Workbooks are a class of printed material used to augment or replace regular instructional texts by providing a mix of text information and practice exercises within a single book or manual.

PRINTED MATERIAL - TEXTBOOK - Textbooks are a class of printed material dealing with a subject of study, intended for use at a specified level of instruction and used as a principal source of study.

PROGRAMMED TEXT - BRANCHING - A printed text containing frames of information and multiple choice questions concerning the information, organized in such a way that the trainee's choice of response directs him to remedial frames or advanced material, as appropriate. The material is carefully sequenced, tested, and revised to ensure that a specific student population will achieve stated behavioral objectives with a predetermined level of success.

PROGRAMMED TEXT - BRANCHING WITH ADJUNCT MATERIAL/EQUIPMENT - Used with adjunct materials or equipment, a wide range of training application is available.

PROGRAMMED TEXT - LINEAR - A printed text containing a fixed sequence of small frames of information usually in the form of questions requiring the trainee to construct a simple written response, which is immediately evaluated. The material is carefully sequenced, tested, and revised to ensure that a specific student population will achieve stated behavioral objectives with a predetermined level of success.

PROGRAMMED TEXT - LINEAR WITH ADJUNCT MATERIAL/EQUIPMENT - Used with adjunct material or equipment, a wide variety of training application is available.

STUDY CARD SETS - A deck or decks of cards designed to present training information to an individual student.

SPECIAL AND NON-STANDARD ITEMS

AUTOMATIC RATERS - INFORMAL TRAINING - A class of electro-mechanical response rating devices used primarily for informal refresher type training. Typically, a gaming approach is used to offer multiple choice type questions to the trainee. Immediate feedback upon answer choice selection is given in the form of right, wrong, or item score as well as cumulative score.

CARREL - DRY - A small enclosure or alcove incorporating a desk, used for individual studies, without audio-visual or laboratory equipment.

DO-IT-YOURSELF KITS - A type of instructional kit containing instructions and materials for fabricating a usable product. Such a kit offers practical "hands-on" training following theoretical training.

GAME-MANUAL SIMULATION - Any contest between teams or individual players, governed by rules, where the contest is a dynamic model of some real system, and is played without the aid of a computer using gaming techniques.

GAME - MANUAL NON-SIMULATION - Any contest between teams or individual players, governed by rules, where the contest is not a dynamic model of some real system, and is played without the aid of a computer.

GAME - COMPUTER SUPPORTED SIMULATION - Any contest, governed by rules, between teams or individuals, where the contest is a dynamic model of some real system, and a computer is used in performing some of the calculations necessary for the operation of the model as in computer supported war gaming.

LOGIC TRAINERS - A class of trainers that synthetically allow electronic, mechanical, fluid, or gaseous conceptual system logic training without the use of actual hardware.

MOCKUPS, PANELS, AND DEMONSTRATORS - DYNAMIC - A visual training aid that allows an instructor to demonstrate manipulative principle, movement in time or space, steps of a procedure, linear effect within systems or changes in condition of equipment or systems through one or more operating phases.

MODELS AND STATIC MOCKUPS - SMALL SCALE - A three-dimensional training aid built to scale and representing operational equipment. It may be a solid or cutaway model capable of disassembly by which spatial and/or sequential relationships are represented. Also included are layout models, recognition model sets, and terrain or topographical models.

MOCKUPS, PANELS, AND DEMONSTRATORS - STATIC - A training aid used to demonstrate relative shape, size, composition or function of an object or system by a visual-cognitive process performed by the trainee. Such non-moving, real or "scaled" aids include cutaway models, diagrams, blow-apart hardware displays, etc.

APPENDIX B

DECISION MATRICES FOR MEDIA SELECTION

SUB-CATEGORY 1
RULE LEARNING AND USING

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems	Alternative Instructional Delivery Systems								
	Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm							Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm	
	Operational Equipment with Instructor and Instructor Handbook	Simulator with Instructor and Instructor Handbook	Procedure Trainer with Instructor and Instructor Handbook	Computer Assisted Instruction	Teaching Machine, Branching	Programmed Text, Branching	Microfiche with Self-Scoring Tests	Traditional Classroom	Programmed Instruction - Linear
Stimulus Criteria									
● Visual Form									
Pictorial, Plane				X	X	X	X	X	X
Line Construction, Plane				X	X	X	X	X	X
Object, Solid	X	X	X					X	
Environment	X	X	X						
● Visual Movement									
Limited		X	X	X	X			X	
Full	X	X	X	X					
● Visual Spectrum									
Gray Scale				X	X	X	X	X	X
Color	X	X	X	X	X		X	X	
● Audio									
Voice Sound Range	X	X	X	X	X			X	
Full Sound Range	X	X	X						
Ambient Sounds	X	X							
● Other									
[illegible] Cues	X	X	X						
Internal Stimulus Motion Cues	X	X	X						
External Stimulus Motion Cues	X	X							
Instructional Setting Criteria									
● Individual Trainee at Fixed Location	X	X	X	X	X	X	X	X	X
● Individual Trainee with Independent Instruction at Any Location						X	X		X
● Small Group								X	
● Large Group at a Single Location								X	
Administrative Criteria									
● Site of Courseware and Special Hardware Development									
Local						X	X	X	X
Central	X	X	X	X	X	X	X		X
● Magnitude of Acquisition Cost									
Low			X		X	X	X	X	X
High	X	X	X	X	X				

SUB-CATEGORY 2
CLASSIFYING

Directions:

To choose a delivery system:

1. Place a "✓" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "✓". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems										
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm					Delivery Approaches NOT Permitting Complete Application of Learning Guideliens and Algorithm					
		CAI w/Adjunct Equipment and Materials	Study Card Sets	Microfiche	Teaching Maching - Branching	Simulator with Adjunct Displays or Instructor	Slide Sets with Instructor	Traditional Classroom with AV Materials	Audio Recorders - Disc or Tape	Specimen Set	Sound Slide/Film Strip Program	
Stimulus Criteria												
● Visual Form												
Alphanumeric		X	X	X	X	X	X	X			X	
Pictorial, Plane		X	X	X	X		X	X			X	
Line Construction, Plane		X	X	X	X		X	X			X	
Object, Solid						X				X		
Environment						X						
● Visual Movement												
Still		X	X	X	X		X	X		X	X	
Limited		X			X			X			X	
Full						X		X				
● Scale												
Exact Scale						X				X		
● Audio												
Voice Sound Range		X			X	X	X	X	X		X	
Full Sound Range						X			X			
Ambient Sounds						X						
Other Tactile Cues						X				X		
Internal Stimulus Motion Cues						X						
External Stimulus Motion Cues						X						
Training Setting Criteria												
● Individual Trainee at a Fixed Location		X	X	X	X	X	X		X	X	X	
● Individual Trainee with Independent Instruction at Any Location			X	X					X		X	
● Small Group							X	X	X		X	
● Large Group at Single Location							X	X	X		X	
Administrative Criteria												
● Site of Courseware and Special Hardware Development												
Local			X	X	X		X	X	X	X	X	
Ce[illegible]		X	X	X	X	X	X	X	X	X	X	
● Magnitude of Acquisition Cost												
Low			X	X			X	X	X	X	X	
High		X			X	X						

SUB-CATEGORY 3
IDENTIFYING GRAPHIC SYMBOLS

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems									
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm					Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm				
		CAI (with visual display)	Teaching Machine - Branching	Programmed Text - Branching	Microfiche with Self-Scoring Tests	Study-Card Sets with Self-Scoring Tests	Traditional Classroom	Textbook	Chart	Automatic Rater	
Training Setting Criteria											
● Individual Trainee at a Fixed Location		X	X	X	X	X		X	X	X	
● Individual Trainee with Independent Instruction at Any Location				X	X	X		X	X		
Administrative Criteria											
● Site of Courseware and Special Hardware Development											
Local				X	X	X	X	X	X	X	
Central		X	X	X	X	X		X	X	X	
● Magnitude of Acquisition Cost											
Low				X	X	X	X	X	X	X	
High		X	X								

SUB-CATEGORY 4
DETECTING

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems							
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm					Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm		
		Operational System with Stimulated Signals, and an Instructor with Instructor Handbook	Simulator with Instructor and Instructor Handbook	Simulator with Adjunct Displays and Logic	Procedure Trainer, with Instructor and Instructor Handbook	Procedure Trainer with Adjunct Displays and Logic	Operational System with Instructor	Informal On-the-Job Training on Operational System	
Stimulus Criteria									
● Full Visual Environment		X					X	X	
● Full Ambient Sounds		X	X	X			X	X	
● External Stimulus Motion Cues		X	X	X			X	X	
Training Setting Criteria									
● Individual Trainee at Fixed Location (School)		X	X	X	X	X	X		
● Individual Trainee On-the-Job		X					X	X	
Administrative Criteria									
● Site of Courseware and Special Hardware Development									
Local							X	X	
Central		X	X	X	X	X			
● Magnitude of Acquisition Cost									
Low								X	
High		X	X	X	X	X	X		

SUB-CATEGORY 5
MAKING DECISIONS

Directions:

To choose a delivery system:

1. Place a "✓" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "✓". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems									
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm						Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm			
		Simulator Diagnostic Tests with Instructor	Manual Simulation Game with Diagnostic Tests and Instructor	CAI with Adjunct Equipment and Materials	Teaching machine - Branching	Microfiche with Self-Scoring Tests	Programmed Text - Branching with Self-Scoring Tests	Operational System with Tutor	Case Study Materials w/wo Instructor	Role Playing Materials with Instructor	
Stimulus Criteria											
● Visual Form											
Alphanumerics			X	X	X	X	X		X	X	
Pictorial, Plain			X	X	X	X	X		X	X	
Object, Solid		X						X		X	
● Visual Movement											
Still			X	X	X	X	X		X		
Full Movement		X		X				X			
● Audio											
Voice Sound Range		X	X	X	X			X		X	
Full Sound Range		X						X			
● Other											
Tactile Cues		X						X			
External Stimuli Motion Cues		X						X			
Training Setting Criteria											
● Individual Trainee at Fixed Location		X	X	X	X	X	X	X	X		
● Independent Trainee with Independent Instruction at Any Location						X	X				
● Small Group								X	X	X	
● Team Setting		X	X					X		X	
Administrative Criteria ● Site of Courseware and Special Hardware Development											
Local			X			X	X		X	X	
Central		X	X	X	X	X	X	X	X	X	
● Magnitude of Acquisition Cost											
Low			X			X	X		X	X	
High		X		X	X			X			

SUB-CATEGORY 6

RECALLING BODIES OF KNOWLEDGE

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems: Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm					Alternative Instructional Delivery Systems: Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm			
		CAI	Teaching Machine - Branching	Microfiche with Self-Scoring Tests	Programmed Text - Branching with Self-Scoring Tests	Audio Visual Carrel with Program Texts, AV Modules and Self-Scoring Tests	Traditional Classroom with Instructor, Overhead Projector, Texts, and Paper and Pencil Tests	Independent Study Using Textbooks, Handbooks, Tests and Workbooks	Instructional Television Broadcast or CCTV Without Feedback, Tests	Programmed Text - Linear with Instructor Scored Criterion Test
Stimulus Criteria										
● Visual Movement										
Limited		X	X			X			X	
Full		X				X			X	
● Visual Spectrum										
Full Color		X	X	X		X	X	X	X	
● Audio										
Voice Sound Range		X	X			X	X		X	
Full Sound Range						X				
Training Setting Criteria										
● Individual Trainees at Fixed Location		X	X	X	X	X	X		X	X
● Individual Trainees with Simultaneous Instruction at Many Locations									X	
● Individual Trainees with Independent Instruction at Any Location				X	X			X		X
● Small Group							X		X	
● Large Group at a Single Location							X		X	
● Team Setting										
Administrative Criteria										
● Site of Courseware and Special Hardware Development										
Local				X	X	X	X	X		X
Central		X	X	X	X	X		X	X	X
● Magnitude of Acquisition Cost										
Low				X	X		X	X		X
High		X	X			X			X	

SUB-CATEGORY 7
PERFORMING GROSS MOTOR SKILLS

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems				
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm		Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm		
		Tutor in a Job-Like Setting with Equipment, if required, an Instructor Handbook and Student Diagnostic Tests	Tutor in a Job-Like Setting with equipment, if required, an Instructor Handbook, Student Diagnostic Tests, and Portable TV with a Record/Playback Capability and a Series of Taped Demonstrations	Programmed Text - Branching and a Series of Film Loops with Equipment, if required, and a Part-Time Instructor with Criterion Tests	Supervisor Managed Informan On-The-Job Training	
Training Setting Criteria						
● Individual Trainee at a Fixed Location		X	X	X		
● Individual Trainee with Independent Instruction at Many Locations				X	X	
● Small Group					X	
● Team Setting		X	X		X	
Administrative Criteria						
● Site of Courseware Development						
Local		X	X	X	X	
Central		X	X	X		

SUB-CATEGORY 8

STEERING & GUIDING — CONTINUOUS MOVEMENT

Directions:

To choose a delivery system:

1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "√". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems					
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm				Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm	
		Operational System, Real Environment with Instructor and Instructor Handbook	Simulator with Motion Platform and Full Visual Field, Instructor and Instructor Handbook	Simulator (Without Motion Platform and Full Visual Field) Instructor and Instructor Handbook	Procedure Trainer, Instructor and Instructor Handbook	Operational System, Real Environment, Without Instructor	
Stimulus Criteria							
Full Visual Environment		X	X			X	
External Stimulus Motion Cues		X	X			X	
Fine Movement Manipulative Acts		X	X	X		X	
Broad Movement Manipulative Acts		X	X	X	X	X	
Training Setting Criteria							
Individual or Team Training at a Fixed Location		X	X	X	X	X	
Individual or Team Training with Independent Instruction at Many Locations		X				X	
Administrative Criteria							
Site of Courseware and Special Hardware Development							
Local		X				X	
Central		X	X	X	X	X	

SUB-CATEGORY 9

RECALLING PROCEDURES AND POSITIONING MOVEMENT

Directions:

To choose a delivery system:

1. Place a "✓" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "✓". These are the candidate delivery systems.

		Alternative Instructional Delivery Systems											
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm								Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm			
Criteria for Selecting Instructional Delivery Systems		Operational System in Laboratory with Tutor	Simulator with Tutor and Tests	Procedures Trainer with Tutor and Tests	Logic Trainer with Tutor	CAI with Photo or Operable Mockup	Teaching Machine with Photo or Operable Mockup	Microfiche w/wo Photo or Operable Mockup	Programmed Text - Branching	Laboratory Carrel with Equipment and Linear Instructional Materials	Operational System in Real Environment with Tutor	Texts, Lectures and Demonstrations	
Complexity Criteria													
● Difficult Motor Acts		X	X	X	X					X	X		
● Smooth Motor Performance at End of Training		X	X	X						X	X		
Stimulus Criteria													
● Visual Form													
Alpha-Numeric		X	X	X	X	X	X	X	X	X		X	
Pictorial, Plane					X	X	X	X	X	X		X	
Object, Solid		X	X	X	X					X	X	X	
● Visual Movement													
Still					X	X	X	X	X	X		X	
Full Movement		X	X	X	X	X				X	X		
● Audio													
Voice Sound Range		X	X	X		X				X	X	X	
Full Sound Range		X	X	X						X	X		
Ambient Sounds		X	X	X							X		
● Other													
Tactile Cues		X	X	X						X	X		
Internal Stimulus Motion Cues		X	X	X						X	X		
Training Setting Criteria													
● Individual Trainee at Fixed Location		X	X	X	X	X	X	X	X	X	X	X	
● Individual Trainee with Independent Instruction at Any Location								X	X				
● Small Group					X							X	
● Large Group at Single Location												X	
● Team Setting		X	X	X	X						X		
Administrative Criteria													
● Site of Courseware and Special Hardware Development													
Local								X	X	X	X	X	
Central		X	X	X	X	X	X	X	X	X	X		
● Magnitude of Acquisition Cost													
Low								X	X	X		X	
High		X	X	X	X	X	X			X	X		

SUB-CATEGORY 10
VOICE COMMUNICATING

Directions:

To choose a delivery system:

1. Place a "✓" (light pencil) in boxes representing criteria (rows) that must be met.

2. Select the delivery systems (columns) that have an "X" in each row designated by a "✓". These are the candidate delivery systems.

Criteria for Selecting Instructional Delivery Systems		Alternative Instructional Delivery Systems							
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm			Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm				
		Simulator with Instructor, Instructor Handbook, and Diagnostic Tests	Procedure Trainer with Instructor, Instructor Handbook and Diagnostic Tests	Language Laboratory, Audio, Active-Compare Mode, with Manual Simulation Game and Instructor	Language Laboratory, Audio, Active-Compare Mode, with Printed Materials	Performance Aid	Traditional Classroom	Operational Equipment in Real Environment with Instructor	
Stimulus Criteria									
● Visual Form									
Pictorial, Plane				X	X	X	X		
Solid Object		X	X					X	
● Visual Movement									
Still				X	X	X	X		
Full Movement		X	X					X	
● Audio									
Voice Sound Range		X	X	X	X		X	X	
Ambient Sounds		X	X	X	X			X	
Training Setting Criteria									
● Individual Trainee at a Fixed Location		X	X	X	X		X	X	
● Individual Trainee with Independent Instruction at Any Location						X			
● Team Setting		X	X	X		X		X	
Administrative Criteria									
● Site of Courseware and Special Hardware Development									
Local						X	X	X	
Central		X	X	X	X	X			
● Magnitude of Acquisition Cost									
Low				X	X	X	X		
High		X	X					X	

SUB-CATEGORY 11

This chart is useful in selecting an instructional delivery system for the affective and behavioral components of attitude learning. For achieving the cognition component use instructional delivery systems suggested for recalling bodies of knowledge

ATTITUDE LEARNING

	Directions: To choose a delivery system: 1. Place a "√" (light pencil) in boxes representing criteria (rows) that must be met. 2. Select the delivery systems (column) that have an "X" in each row desig…ated by a "√". These are the candidate delivery systems.	Alternative Instructional Delivery Systems						
		Delivery Approaches Permitting the Application of All Learning Guidelines and Algorithm		Delivery Approaches NOT Permitting Complete Application of Learning Guidelines and Algorithm				
Criteria for Selecting Instructive Delivery Systems		Operational Job Setting with Instructor and Instructor Handbook with Diagnostic Attitude Tests	Simulated Job Setting with Instructor and Instructor Handbook with Diagnostic Attitude Tests	Roll Playing	Case Studies	On-The-Job Training by Supervisors	Lectures, Seminars, etc.	
Training Setting Criteria								
● Individual Trainee at Fixed Location		X	X		X			
● Individual Trainee with Independent Instruction at Many Locations						X	X	
● Small Group		X	X	X	X	X	X	
● Team Setting		X	X	X	X	X	X	
Administrative Criteria								
● Site of Courseware Development								
Local		X		X	X	X	X	
Central		X	X	X	X			
● Magnitude of Acquisition Cost								
Low				X	X	X	X	
High		X	X					

APPENDIX C

DESCRIPTION OF VARIOUS MANAGEMENT PLANS

APPENDIX C

DESCRIPTIONS OF VARIOUS MANAGEMENT PLANS

I. Student Management Plans

Students must receive information and guidance; they must understand the objectives and receive feedback; they sometimes need motivation and counseling. The instructor is ultimately responsible for seeing that activities like these occur; however, the instructor is not always responsible for actually providing all of these activities. This can be explained better by looking at some different student management plans.

There are a variety of student management plans. Some examples are: (1) instructor-managed, (2) contingency-managed, (3) peer-managed, (4) computer-managed, (5) media-managed, (6) student self-managed, and (7) combination plans. The instructor's responsibilities for student management can be different under each of these plans. For example, under an instructor managed plan like lecture/conference, the instructor would have a very broad student management responsibility; on the other hand, under a computer-managed plan, the computer could assume many of the student management responsibilities.

II. Instructor-Managed Instruction

1. Group mode. Instructor-managed methods of instruction in the group mode include lecture, conference, demonstration, study assignment, etc. These methods are described in the second section of this

block (Section 2.3.1). The instructor's student management responsibilities are, of course, quite comprehensive.

2. Individual mode. An instructor-managed plan in the individual mode would be called instructor-tutorial. Although instructors often give individual attention, courses are seldom built around this plan. It simply takes too much instructor time to manage each individual student through a course. The instructor-tutorial plan is used when the priority and criticality of the task warrants extremely detailed, closely monitored instruction, or when the number of students is very small.

III. Contingency-Managed Instruction

Contingency management is giving reinforcement to change behavior or strengthen behavior in a desired direction. A reinforcer is a cue that follows a behavior that a student was engaged in and makes more likely the recurrence of that behavior. Proper management of reinforcers can be a significant aspect of student management.

1. Group mode. Reinforcement often occurs in group instruction; for example, teacher praise for an on-task behavior, letting students who demonstrate comprehension leave class early, etc. Careful attention to student reinforcement is, in fact, a valuable group leadership technique; however, it is seldom developed to the point where it becomes significant in the overall management of all students. Proper use of this technique requires practice and adherence to a carefully prepared plan.

2. Individual mode. When instruction is offered in the individual mode, proper management of reinforcers can be a significant aspect of the management of students.

Reinforcing events must be given to students at the right time, and must be tied to attaining objectives of the course. Contingency management plans should be considered for student groups which are typically unmotivated, particularly in the case where the instructional content is not motivating in itself. Two main problems are associated with reinforcement: identifying appropriate reinforcers, and controlling them in the instructional system.

Two sources of ideas for identifying reinforcers have been suggested--need satisfiers (for example, knowledge of results), and highly probable behavior (for example, talking to other students). Specific reinforcers would include:

Rest periods and breaks.

Passes.

Freedom from disagreeable details.

Demonstrating proficiency to others and to oneself.

Since a separation frequently exists between the instructional system and the agency responsible for the housing, feeding, and administration of the students, many of the significant reinforcers are under the control of the school commander. In order for reinforcers to be delivered on the basis of achievement of the objectives, they must be under the control of the instructional management system. Staff members must be trained to administer contingency managed systems; some research has shown that untrained staff unknowingly reinforce undesirable instead of desired behavior, and sometimes give reinforcers away free instead of making them contingent on the desired training objective achievement.

Contingency management plans have been shown to have good effects in instructional settings where low aptitude students are involved. Before instituting contingency management in a course, several factors should be considered:

a. Have the reinforcers been established as effective with the group in question?

b. Has the instructional administration been given the authority to control the contingency management plan and its reinforcers? If not, this authority should be established. When authority cannot be given to control reinforcers which would occur outside the instructional setting, the reinforcers should be restricted to those in instruction.

c. Has the instructional staff, both management and instructing, been given sufficient training in contingency management to make the system work? If not, the training should be provided before the management plan is implemented.

Student contracting is a method often used in contingency-managed instruction. It is a management technique whereby a performance contract is drawn up between the student and the instructor. The contract specifies exactly what the student is expected to do, and what rewards he will receive. The reward is, of course, contingent upon satisfactory completion of the contract.

Contingency management plans should only be established with the guidance of trained professionals.

IV. Peer-Managed Instruction

The plan of using students to manage other students has been successfully implemented in various instructional settings. It is most often called peer tutoring because it usually involves one student tutoring one of his peers (another student).

1. Group mode. Peer management of instruction in the group mode seldom occurs. In seminars, case study, and other forms of small group instruction, individual students are often responsible for preparing group presentations, but the real responsibility for student management never shifts away from the instructor.

2. Individual mode. Peer management can be developed into a unique student management plan, or it can be incorporated into any self-paced instructional plan, including one which uses contingency management. Since peer tutoring is a method of demonstrating one's own proficiency to someone else, it is a motivational as well as a tutoring system.

In peer tutoring, the student who reaches proficiency instructs other students in the skills or processes to be learned. In learning job performances, the student watches as an advanced student or an instructor performs the job duty or duties, is instructed to perform the job duties by the person whose job performance he watched, and takes proficiency tests. After passing the proficiency tests, the student becomes an instructor of a third student. If the learning situation is organized by objectives in a course, the student who masters an objective can be a tutor for the student who is beginning this objective or needs help with it. Obviously, this method is suitable to use with contingency management as the motivation described in displaying proficiency.

Peer tutoring is adaptable particularly to medium and low ability students, and in a self-paced setting where the instruction is highly structured. All individuals who tutor should be previously trained to tutor, and instruction should be spot-checked as a quality control measure.

V. Computer-Managed Instruction

1. Group mode. The closest thing to computer-managed instruction in the group mode is called computer-assisted instruction (CAI). In CAI, the computer takes over many of the administrative functions like grading, record keeping, reporting, etc. More advanced forms of CAI will also monitor student performance, construct individual tests, etc. In both cases, however, the instructor remains the primary student manager; the computer is really an instructional aid.

2. Individual mode. The simplest set of procedures followed in using computer-managed instruction in the individual mode are testing, diagnosing, prescribing, and reporting. In this form, the student reports to the computer terminal, signs on with his own student number, and takes a pretest or unit test, which the computer diagnoses according to preset decision rules. A prescription is presented for the student and instructor, describing the succeeding step for the student based on his test results, and at specified times, reports are generated for the instructor and the administration, so that they have up-to-date records on all students. This process is repeated for each unit.

In the computer-managed setting, the instructor is still an important figure, but he is a resource rather than a manager. One of the requirements in setting up a computer-managed instruction system is retraining instructors in techniques that will improve the instruction for the students.

Computer Report to the Student

In the simulated system, the student signs on to the computer terminal with his own number, and the report that is printed out to him includes identification information, so that he can be sure he is getting the right material, and an assignment including sources of materials. He gets an estimated time for performing the assignment, and finds out how many incentive units he can gain on this lesson.

Simulated Report to the
Student (before lesson)

AFSN	NAME	COURSE	BLOCK	LESSON	INSTRUCTOR	DATE
224726	Frost,CP	PME	IV	A	Huyt, RE	10/22/72

Your assignment is .....

First you should sign on to a computer terminal and read lesson 5. This will help you improve your reading speed. Next read Chapter 6 on electron emission in the electronics textbook TB 371. Finally, do exercises 1-7 in workbook WB 3ABR32410-17.
Estimated time for this assignment is 1 hour.
You may receive 1 incentive unit for each minute saved in addition to 5 incentive units for receiving a score of 80% or better.

If the student completes the lesson successfully, he gets a message like the one below:

Simulated Report to the
Student (after lesson)

AFSN	NAME	COURSE	BLOCK	LESSON	INSTRUCTOR	DATE
224726	Frost,CP	PME	IV	A	Huyt,RE	10/22/72

You have achieved a score of 91% mastery for lesson A, Electron Emission. This is passing and merits 5 incentive units. Your assignment was completed in 31 minutes, a gain of 29 minutes, which merits a total of 29 incentive units. Incentive units earned may be applied to any of the incentive items on the list passed out to you for this course.

If the student had not reached mastery, his message would have read:

> "You have received a 78% score for lesson A, Electron Emission. This is failing. You seem to be having trouble with this material. It is suggested that the following people in your class may be able to help.
> Creamer, U.R.
> Yaeger, P.H.
> Paul, T.H.
> Troutman, R.S."

The computer-managed instructional plan shows self-pacing, individualization of treatments (for example, the reading treatment), contingency mangement, and peer tutoring for remediation.

The simulated report to the instructor, below, shows the information the instructor has on all students, up to date. Each student who failed to reach mastery on the first try (see AFSN 323237) was given a different treatment on each successive try, illustrating remediation individualization.

Simulated Monitoring Report
to the Instructor

INSTRUCTOR	COURSE	BLOCK	LESSON	DATE
Huyt, R.E.	PME	IV	A	10/27/72

Summary

Students passing = 14 Average Mastery Score = 84 Range = 80 to 92

Students Who Failed to Reach Mastery on First Try

Name	AFSN	Average Score	Average Time
Danner, D.E.	323237		

Student Individual Records

AFSN	Treatment Assigned	Rank Order	Mastery Score Predicted/Obtained	Time Predicted/Obt.	Incentives Gained
873586	1	1	91/88	54/38	27
780538	1	1	84/81	48/50	15
220550	1	1	86/82	50/70	5
935596	1	1	88/92	51/48	17

Simulated Monitoring Report to the Instructor (continued)

423993	1	1	85/81	49/64	5
323237	4	1	81/78	64/38	0
323238	1	2	84/76	47/48	17
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
417767	4	1	81/84	45/31	34

Many of the methods in this computer-managed plan can be used in an instructor-managed plan, but the varied treatments, and the prediction methods cannot be economically done by humans alone. If a computer is available for instructional purposes, it is most economical to use it to capacity, and most efficient to use techniques for improving instruction that humans cannot readily handle.

VI. Media-Managed Instruction

Often, many of the student management activities can be prepared and then communicated to the student through a medium or a combination of media. Communication media can seldom take the place of the instructor as completely as a computer can, but broad usage of media for student management is both wide-spread and successful. In their application, media can perform any role from simple aids within any of the previously described plans, to a position of shared management responsibility, or even to being the predominant instructional manager.

1. Group mode. The use of media-managed instruction in the group mode occurs with regularity in only two instances: instructional television (ITV) and group simulation activity. The ITV technique employs open circuit or closed circuit distribution, or on-location video tape playback to carry the burden of instruction to a classroom of students. Often,

what one might consider to be media-managed instruction is really teacher-managed. This is true when ITV is used as a resource, much like a printed text or a student handbook, to facilitate the instructor's activities. Group simulation activity (though sometimes media-managed) is most often used as an aid under another student management plan.

2. Individual mode. The most common form of media-managed instruction involves the use of print media; for example, workbooks, course manuals, course guides, programmed texts, textbooks, etc. These print media are the most common "manager" of instruction. For example, a course manual usually tells the student what is expected of him, where to go for materials, what mechanical and electrical media sources to use, how to branch or review, etc.

Print-media management is commonly found as part of instructor, contingency, peer, computer and self-managed instruction. Its advantages of convenience, portability, low cost, rapid access, and revisability contribute to its central importance in instruction.

VII. Student Self-Managed Instruction

In this management form, a student is provided with objectives; the student must them personally identify everything required to reach those objectives, plan his own learning strategy, and manage himself through the entire process.

This is not a typical management plan in task oriented training, and it is not found at all in group mode instruction. However, for high ability students in instructional situations where attitude and problem solving objectives are important, self-managed learning can be refreshing and rewarding.

VIII. Combination Plans

It was previously mentioned that the use of print media-management regularly occurs in all of the student management plans described here. That is an example of some possible combinations. Elements of all six plans (instructor, contingency, peer, computer, media, and self-managed) could conceivably be used in combination or individually at various stages of a course.

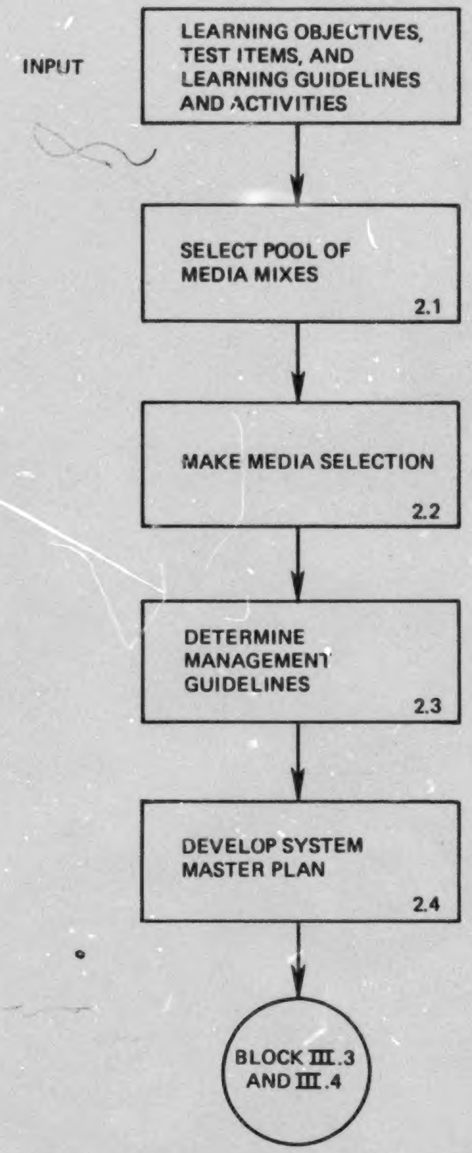
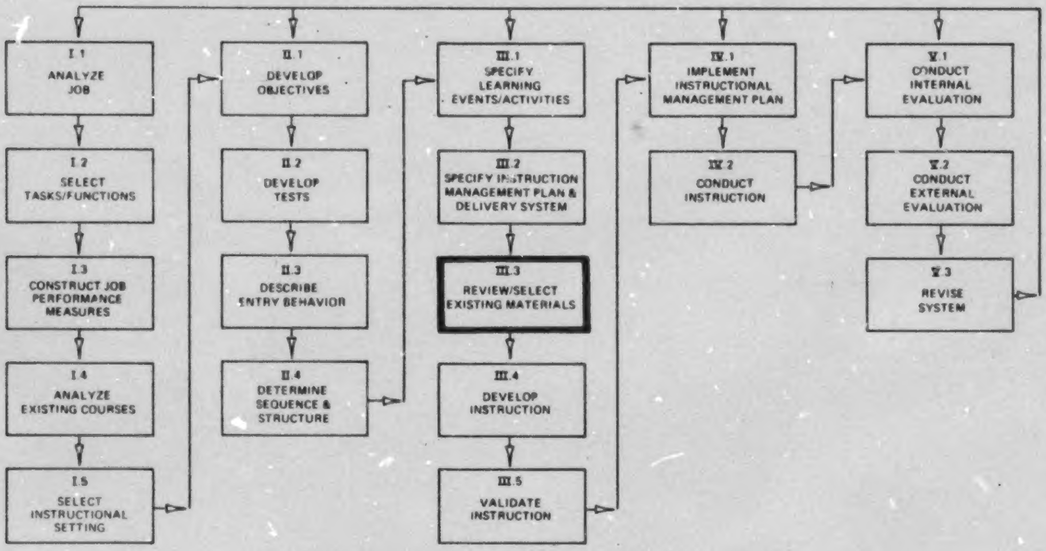

INPUT
LEARNING OBJECTIVES, TEST ITEMS, AND LEARNING GUIDELINES AND ACTIVITIES
SELECT POOL OF MEDIA MIXES
2.1
MAKE MEDIA SELECTION
2.2
DETERMINE MANAGEMENT GUIDELINES
2.3
DEVELOP SYSTEM MASTER PLAN
2.4
BLOCK III.3 AND III.4

FIGURE III.3: Flowchart of Block III.2: SPECIFY INSTRUCTION MANAGEMENT PLAN AND DELIVERY SYSTEM

BLOCK III.3: REVIEW/SELECT EXISTING MATERIALS


I.1 ANALYZE JOB
I.2 SELECT TASKS/FUNCTIONS
I.3 CONSTRUCT JOB PERFORMANCE MEASURES
I.4 ANALYZE EXISTING COURSES
I.5 SELECT INSTRUCTIONAL SETTING
II.1 DEVELOP OBJECTIVES
II.2 DEVELOP TESTS
II.3 DESCRIBE ENTRY BEHAVIOR
II.4 DETERMINE SEQUENCE & STRUCTURE
III.1 SPECIFY LEARNING EVENTS/ACTIVITIES
III.2 SPECIFY INSTRUCTION MANAGEMENT PLAN & DELIVERY SYSTEM
III.3 REVIEW/SELECT EXISTING MATERIALS
III.4 DEVELOP INSTRUCTION
III.5 VALIDATE INSTRUCTION
IV.1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV.2 CONDUCT INSTRUCTION
V.1 CONDUCT INTERNAL EVALUATION
V.2 CONDUCT EXTERNAL EVALUATION
V.3 REVISE SYSTEM

OVERVIEW

Developing instructional materials is both costly and time-consuming. Therefore, it is essential to consider the usefulness of existing materials before committing resources to new development. In this block, existing materials are reviewed and evaluated in terms of their appropriateness to the learning objectives, learner characteristics, and selected learning guidelines and management plan.

REVIEW/SELECT EXISTING MATERIALS

1.0 INTRODUCTION

This block in the ISD model is critical in terms of potential time and dollar savings. In following the ISD process up to this point, exactly what instruction is needed to meet the training goals has been specified. In the next block, III.4: DEVELOP INSTRUCTION, the procedures for instructional development will be outlined. But that omits an important step. Many of the learning objectives that must be trained are already being trained with some success. ISD does not ignore the effective lectures, films, and textbooks currently in use. On the contrary, it incorporates as many existing materials as possible. The purpose of Block III.3: REVIEW/SELECT EXISTING MATERIALS, is to retain as many existing materials as possible. This means that in the next block, instruction will be developed only for those learning objectives which were specified in Block III.1 and III.2, but for which no adequate existing learning materials can be located.

Prior steps in the ISD process have led to the development of learning objectives (Block II.1), the description of student entry behavior (Block II.3), the selection of specific learning guidelines (Block III.1), and the selection of an appropriate management plan and delivery system (Block III.2). These decisions now can be used as criteria to help determine the usefulness of existing materials. An overview of Block III.4, DEVELOP INSTRUCTION, will provide some idea of the amount of time and money necessary to develop new instruction. By adopting existing instruction, or modifying it as necessary, the cost of instructional materials can be reduced.

One way to describe the process of selecting and reviewing existing materials is to contrast it with the process of analyzing existing courses in Block I.4. That block reviewed the course development documentation and asked, "Are the proper tasks being taught?" In this block, individual pieces of instruction, a single lecture, or filmstrip, are reviewed. The question asked is not "Are the proper tasks being taught?" but, "Are the tasks being taught properly?" In Phase I the concern was with the gross task of deciding "what" should be taught. In Phase III, we have decided on "what" and now are concerned with "how;" how should these tasks be taught?

The difference in emphasis between Blocks I.4 and III.3 is reflected in the source references for each. Block I.4 requires information about the course, its development and validity. Is the content based on a recent and thorough task analysis? What were the criteria used in selecting which tasks should be taught? What are the performance requirements? Block I.4 evaluates the merit of an entire course on the basis of how it was developed, the procedure that was employed. The evaluator does not necessarily need the course materials in hand when deciding its merits. Information describing the course development and effectiveness is sufficient.

In this block, however, you evaluate the instructional materials. The concern is not with where the material comes from, only what it has to offer. Here, you determine its suitability to the program requirements developed in previous blocks.

One feature of this block is that the instructional materials review is not limited to military sources. Civilian resource centers, such as universities, libraries, and city or industrial training centers may house useful descriptions and illustrations. Thus, the search required in this block is more extensive and intensive than that required in Block I.4.

Basically, the review and selection procedure consists of evaluating promising instructional materials to determine if they are appropriate to the objectives, learner characteristics, learning guidelines, management plan, and delivery system selected in previous blocks. A perfect match will not be found, but materials may be located that require only minor modification. Both modification of instructional materials to match previously made decisions, and modification of previous decisions to match existing materials will be discussed.

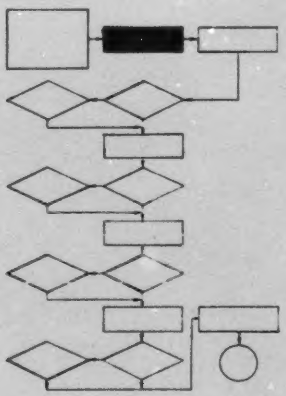
The steps in the procedure for reviewing and selecting existing materials are shown on the flowchart in Figure III.11, the foldout page at the end of this block.

2.0 PROCEDURES

The true worth of any instructional material is its effectiveness with students. Only by trying out instruction on a representative sample of students will you be able to determine the actual value of the materials. Ideally, you should base your decision of what to use as is, what to modify, and what to drop, on the basis of validation data from such actual tryouts. Unfortunately, empirical evidence is rarely available. Therefore, you will have to conduct tryouts yourself. But you probably cannot try out every available existing unit of material to determine its effectiveness.

There is simply too much available material. Select the best material and test it on a sample of actual students. The procedures for this process are discussed in Block III.5, VALIDATE INSTRUCTION.

2.1 Collect Existing Materials

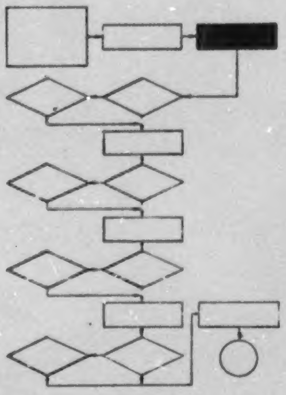


The first step in this procedure is to locate as many instructional materials relevant to the learning objective as practical. Appendix B (page 95) of Block I.1 is a list of some possible sources for materials. These materials need not have been designed for classroom use. But they must have a potential for instructional payoff.

Materials may be located according to their objectives. Many instructional materials developed since 1970 will have been developed by procedures similar to those in this manual, and their objectives will be documented. Most materials, however, will offer only a title and perhaps a short summary. This should be enough information to indicate if the materials may be "close to the mark." The amount of material to be reviewed may be too extensive to allow time to follow up on materials that do not sound promising.

It is difficult to determine when the collection process is complete. On the one hand, it is wasteful to collect thirty documents only to discover that the first document submitted was entirely adequate. On the other hand, it is equally wasteful to alter drastically the first item that is submitted, when the thirtieth item may be acceptable without modification. Therefore, it is advisable to collect all relevant information as expediently as possible during this stage of the process. If more than one selection is found that appears consistent with the objectives, each should be identified. Subsequent steps in this block, or in the validation process in Block III.5, may prove the first choice to be inadequate. In that case, consider a second or third choice. Only through validation procedures will the true effectiveness of the materials be determined.

2.2 Evaluate Existing Materials/Learner Characteristics



The next steps in the procedure involve reviewing each segment of instruction for its appropriateness to the ISD process. This involves an evaluation of the appropriateness of each segment to the predetermined learner characteristics, learning guidelines, delivery system, and management plan.

It is important to recognize the decreasing precision and exactness required of materials as when moving from learner characteristics to learning guidelines, to delivery system, and to management plan. The flexibility, or leeway in decision making, increases while progressing through the block. Learner characteristics are quite specific. If materials are not prepared for the correct audience, they must be modified or dropped. Learning guidelines are a bit more flexible. They do not provide a step-by-step learning sequence, only general direction.

They are as their name implies, mere guidelines. The delivery system is even more flexible, and the management plan more flexible still. Most of the decisions to drop or modify materials will come early in the decision-making process. Very few materials that are satisfactory in guidelines and delivery systems will prove unsatisfactory in terms of their management plan.

Remember, the purpose of Block III.3 is to retain as many existing materials as possible. Instruction that is not quite adequate in its present form may be modified. Consultation with media specialists will determine if appropriate modification is permissible or possible, and if so, whether modification will be more cost-effective than development of new instructional materials. If it is cheaper to develop new materials, drop the existing materials. Determine the most cost-effective alternative for meeting objectives, and then follow through on it.

2.2.1 Evaluate Materials

One point should be emphasized here. The procedure for reviewing existing materials involves proceeding from criterion to criterion for each item. Do not go through 100 items, judging their appropriateness to a predetermined learner characteristic, and then review them all over again in light of the next criterion. Instead, review one segment of instructional material and ask if it is useable. Are the learner characterisitics, learner guidelines, delivery system, and management plan satisfactory? If not, will modification be cost-effective? Make that decision before reviewing the next item. Once you have the knack of evaluating in this fashion, you will be able to make a number of suitability decisions simultaneously while reviewing each segment of material.

In the first step in this evaluation process, consider the characterisitics of the learners. This topic was first addressed in Block II.3, DESCRIBE ENTRY BEHAVIOR. There external as well as internal requirements were considered. What are the ranks of the student, and how long have they been in the service? What academic credentials or special skills do they possess? What are their aptitude scores? How much experience have they had? How well do they read? If the reviewed materials do not communicate to this type of person, the materials will be of little use. For example, when reviewing materials for learning objectives which center around the operation of intelligence gathering equipment, the learner characteristics clearly indicate that materials must address E4-E7's with a high school education. If you review a manual on the operation of such equipment, find that it satisfies a great many of your objectives, but that the manual was written for college graduates, there is a problem. The vocabulary is difficult, the sentence structure complex, and the technical material densely packed with new and difficult factual information. Although it would take empirical validation to prove it, it seems a fair bet that this manual is not suitable to the characteristics of the specified learners. When a segment of instructional material is unsuitable as it stands, it is appropriate to consider modification.

2.2.2 Make Revision Decision

Materials that clearly match learner characteristics should be retained for further evaluation and those that clearly do not meet them should be rejected. Most materials, however, will fall somewhere between. They will be very good, but not quite good enough. They will not meet the criterion of suitability, but they will come very close. These materials cannot be rejected out of hand, but neither are they acceptable as is. The question then becomes one of modification. Are these materials "close enough" to meeting the criterion that it will be less costly to modify them than to develop new instruction? While materials modification is expensive in terms of time, money and manpower, it is often less costly than developing new materials. The finer details of this decision will require a media or subject matter expert. The broader decisions, however, are yours. The following guidelines will aid decision making.

1. While it is extremely difficult to add to non-written materials using the same mode of presentation, in such a way that your audience "cannot tell the difference" between the new and old, it is very easy to delete material. Thus if modification involves deletion without addition, it is usually less expensive to modify.

   The next question is, "Will this deletion destroy the integrity of the material?" It is easy enough to remove one third of the slides from a slide presentation or delete the last half of a video tape. But it is more difficult to cut and splice film in three or four places without destroying the continuity of the visuals and commentary. Some films may not be modified without explicit approval in writing from the command responsible for production. Often, these approvals are not given.

2. Before modifying the materials, make sure there is a long-time use for them. If yours is a short-term non-critical course, you may consider using the selected materials just as they are.

3. Consider the physical condition of the materials. Have they been modified before? Few non-print materials can bear more than one round of changes without losing their continuity. Printed materials can be rewritten without too much trouble, but films and tapes may have to be completely re-recorded. Materials must be classified by the magnitude of alteration required. Those requiring only minor modification should be tagged accordingly, as should those that will require major changes.

4. A media expert must be consulted for a final judgment. He knows the technical aspects of materials modification, and their relative cost. However, you must decide which materials are worth his consideration.

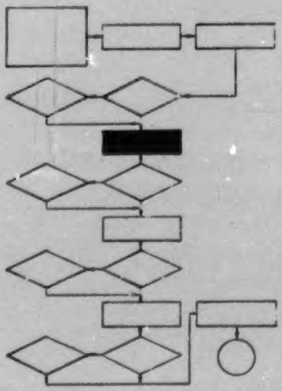
5. A general rule of thumb: The more "exotic" the medium, the more expensive the alteration. Printed materials are not a problem, filmstrips are easy, audio tapes are more difficult, videotapes require expertise, and color film with sound is extremely difficult. Judge accordingly. The more "exotic" the medium the more likely that modification will be expensive.

In summary, follow this general procedure: Review a selection of material. Does it meet the criterion of suitability under consideration? If it does, it is retained and if it does not, it is dropped. If it comes close to addressing the criterion effectively, consider modification. How extensive an alteration will be required to make it usable? If the changes are not too drastic, if not too much must be added or deleted, good. Ask a media expert if the cost of modification will be less than the cost of developing new materials to cover the same objectives. If modification is less expensive, retain the material for further evaluation. If, however, the material will require extensive modification, or the media expert feels it will be less expensive to develop new materials to cover the same objective, the material under consideration should be dropped.

Do not overlook the possibility of keeping the existing materials as they are, and developing adjunct or associated materials to supplement them. If the present materials are satisfactory for most students but too difficult for some, development of remedial materials for the less advanced students might be a suitable solution.

2.3 Evaluate Existing Materials/Learning Guidelines

2.3.1 Evaluate Materials



The next criterion of suitability to apply to a unit of materials is its appropriateness to the learning guidelines selected in Block III.1; that is, to determine to what degree the materials under consideration provide the specific learning guidelines selected for the particular learning objectives under consideration.

Following are some guidelines for making these decisions:

1. Recognize the limits of the learning guidelines within each learning category. They do not offer a ready-made formula for instruction. They are guidelines, nothing more. For example, they do not provide a step-by-step learning sequence. They are organized in a generally sequential fashion--progressing from informing learners of objectives through testing procedures--but they do not determine the content of the instructional materials. There is more to the process of selecting or designing instruction than simply matching each objective with a learning guideline.
2. Learning guidelines do not necessarily address individual objectives. More likely, they guide in the development of instruction for groups, or clusters of objectives. Therefore, when attempting to "match" existing materials to the learning guidelines, keep in mind a group of related learning objectives that require the same learning guidelines. For example, you might have ten learning objectives, each of which require identification of a different part of a helicopter. Most likely all of these "identify" learning objectives will have the same learning guidelines. When reviewing existing materials, consider how well they match the learning guidelines for the group of learning objectives, not just for one single objective.
3. The easiest evaluation to make is probably the negative instance. It may take some time and several viewings to decide if some materials are consistent with a learning guideline. But it does not take long to determine that one is inconsistent. Materials

that violate the guidelines may be dismissed immediately to allow more time to concentrate on promising materials. By rejecting negative instances out of hand you can quickly reduce an imposing amount of material to a manageable size.

4. Select those materials that most efficiently cover the subject, that most efficiently meet the objectives. Some materials will cover many objectives, but will also include material that either addresses no objectives, or addresses objectives that you have not specified. Such material is superfluous and wastes time. The requirement is for materials that "say it all," in terms of the objectives, not materials that "say it all, and then some." Select those materials that will require the least amount of modification.
5. Document the search. When viewing two dozen items of materials on the same subject, the point is reached where the reviewer asks, "have I not seen this before?" He probably has seen it before, if he has not kept a checklist. Different materials that are practically identical may be reviewed. The checklist will help organize the review of materials and avoid repeats.
6. Keep one eye on the learning objectives and one eye on the learning guidelines. The guideline statements are not useful by themselves. They are useful only as they apply to the particular objectives the materials must cover. It may be helpful to think of the learning hierarchy developed in Block II.1. The object here is to see if each item of

material addresses any or all of these objectives. Those materials that address these objectives by employing the proper learning guidelines should be retained for further consideration.

EXAMPLE

Assume instruction is to be developed in military history. The cluster of objectives addressed concerns American Naval involvement in the War of 1812. The learning category most appropriate to this cluster of objectives is subcategory #6, Recalling Bodies of Knowledge. Turn to the list of learning guidelines appropriate to that category. It lists the characteristics to look for in each item of existing instructional material to be reviewed.

Assume you have located a filmstrip on the War of 1812. At this level of specificity, some guidelines require more emphasis than others. For example, #11 refers to phasing out prompts during instruction and #18 to self-pacing instruction for different learner styles and rates of learning. These are important guidelines for conducting instruction but they do not necessarily have to occur during each 15-minute filmstrip. At this particular point in the total course, you may want maximum prompts or minimum prompts. It depends on where you are in the course. Or the filmstrip could be one media option within a self-paced instructional program. Thus, guidelines #11 and #18 seem relatively unimportant when this specific material is considered.

But look at guideline #2, which refers to key words and units. This is appropriate to a filmstrip of the War of 1812. Some guidelines refer only to testing, or practice sessions, or even to rest periods. Review each segment of existing material, whatever form or length it may have, and match it to the guidelines. Determine which guidelines are critical to it and which are not. The specific material will determine which guidelines are important.

By following the procedure used in the above example, you should be able to determine if either of the filmstrips is suitable for further consideration. Also, you should have been able to decide which of the several was best. However, if several filmstrips appear a reasonably good match to the applicable learning guidelines, keep all of them. You can make a final choice later.

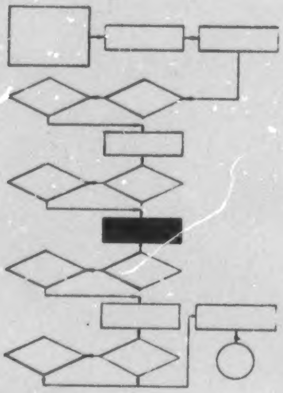
One other consideration is of some importance here, and is of considerable importance in the next section of this block. It concerns the accumulation of modification costs. Some of the materials that have been earmarked for modification here, for learning guidelines, were previously earmarked for modification for learner characteristics. Therefore, you must determine the cost of both modifications as compared to producing new materials to meet the same objectives. In the following section, Delivery System, you may have to base the cost decision on the cost of three modifications. And in the next section, Management Plan, you may have the cost of four modifications to consider against the cost of developing new materials.

EXAMPLE

Consider the filmstrip on the War of 1812. You determined that the vocabulary was a bit too advanced for the intended learners. You consulted a media specialist, and were informed that the subtitles on the filmstrip could be edited for $50. The cost of developing new material to satisfy the same objectives is $500. So you save $450 by planning to edit the subtitles. Now you evaluate the same filmstrip in terms of learning guidelines. Again, the material is good, but not quite good enough. Adding additional material to the filmstrip in order to improve it will cost $100. This involves the addition of new material to meet the unsatisfied guidelines. But you have already earmarked the material for $50 worth of modification in the previous section. Thus, the total cost of modification at this point is $100 plus $50, or $150. That is still less expensive than developing new materials.

Now evaluate the materials again, this time in the light of the selected delivery system. Again, it is close but not close enough. Another modification is required. This time it will cost $150. Now $300 has been accrued in modification costs since beginning the analysis. The price of developing new materials is $500, so it now will save $200 to modify. But there is still one more decision to make. Is the material suitable to the selected management plan? If modification costs of over $200 are incurred at that point, it is no longer less expensive to modify. If modification cannot save money, do not do it unless it can save time when time is critical. Develop something new.

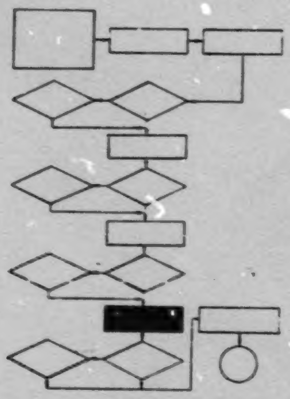
2.4 Evaluate Existing Materials/Delivery System



The next criterion of suitability is the match between the existing material and the delivery system selected in Block III.2. Take all the materials that have been retained after considering their appropriateness to the learning categories. Examine each and decide if it does or does not conform to the preselected delivery system, the medium. Remember that here the media choices are very flexible. Suppose the selected medium, or delivery system, was still-visual. Several options are available. A series of slides, a filmstrip, an actual object, a model, a drawing, an overhead projected transparency, may all be still-visual experiences. A requirement for audio could be a tape recording, or just the soundtrack from a film, videotape, or slide-tape presentation. The latter is a modification and will be discussed next. The goal of the search is to locate materials that may be used as is, without alteration. Only if the search has failed to produce usable "as is" materials are modifications made. However, one of the selection factors in the main selection was costs. Therefore, something "free" may allow a second choice to become a first choice. Materials should not be modified to fit a different media selection without first considering changing the media selection.

Often materials can be quickly and effectively transferred from one medium to another. The rule that applied to "learning guidelines" does not apply here, however. In fact, the rule is just the opposite. The more "exotic" a medium is, the more media it can be broken down into. A simple written page cannot be made into a slide or film or record. But a color sound film may become several media. The visual aspect may become a series of photographs, slides, or transparencies with little difficulty. The audio aspect may become a tape recording, or record or printed page, or radio program.

2.5 Evaluate Existing Material/Management Plan

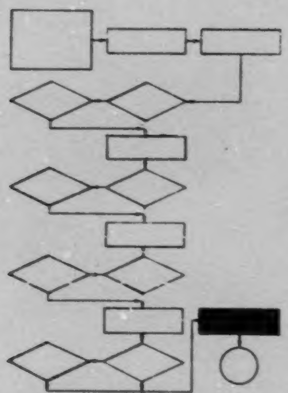


The final criterion of suitability is the management plan. Collect all of the materials that were retained because of their suitability, with or without modification, to your learner characteristics, learning guidelines, and delivery system. Review each to determine whether or not it conforms to the preselected management plan. In most cases the materials will be suitable or the modifications required will be very slight. This is due to the nature of management plans. They are designed to schedule the presentation of materials and activities. If the existing materials do not match the management plan, usually the management plan can be modified to fit the material. There are a few management plan details, however, that might not accommodate all materials. For example:

1. Contingency-managed instruction requires that materials be broken into relatively small units of content so that incentives may be provided to shape desired learning behavior. Some mediated presentations neither provide incentives, nor maintain their continuity and integrity when broken down into smaller units.
2. Self-managed instruction gives the student responsibility for determining his own educational progress. Materials that provide excessive guidance negate the purpose of such instruction.
3. Peer-managed instruction presents much the same situation. The purpose of this particular management plan is to have students assume the types of educational responsibility that directive materials deny them.

In practice, there are very few situations where materials will not fit a preselected management plan "as is." The few that do not should require only minor modification to the materials or the management plan. There is one exception, however. The cost of multiple modifications. If a piece of material is earmarked for modification of "learner characteristics," "learning guidelines," and "delivery system" already, a modification in "management plan" may be more trouble than it is worth.

2.5 Make Required Revisions



These procedures have produced two usable groups of material. The first group includes those materials that have been adopted "as is" and the second group contains those that require modification. The materials that are suitable may be put aside for later inclusion in the course of studies. The materials that will require modification will fall into three categories: those requiring additions, those requiring deletions, and those requiring both.

The materials requiring only deletions or deletions and additions, should be sent to media experts. Advise those experts of the deletions required. The materials that required only deletions may be set aside for later integration into a course of study. The remaining materials will require additions only. Developing materials is covered in Block III.4. Once the additional materials have been developed, return to the media specialist and have him integrate the newly developed materials into the old materials. This completes the work in the block.

3.0 OUTPUTS

The outputs of this block should consist of:

3.1 Products

1. An outline statement of existing materials included in the completed course.
2. A summary statement of material revision activities and costs.

3.2 Other Documentation

1. An outline statement of existing materials considered for inclusion in the course.
2. Rationale for material selection decisions.

EXAMPLES

Sample outline statement of existing materials included in completed course: OH-58 Helicopter Maintenance--

1. Maintain power train assembly

   A. Assemble tail boom

      1) 35 mm slide demonstration "Assembling the OH-58 helicopter tail boom"
      2) Schematic diagram of tail rotor gear box
      3) Exploded view of tail rotor drive shaft
      4) Four page lecture outline "Assembling tail rotor gear box"

   B. Disassemble tail boom

      1) 35 mm slide demonstration "Disassembling the OH-58 helicopter tail boom"
      2) Exploded view of tail rotor drive shaft
      3) Still photograph of disassembled tail boom

Sample summary statement of material revision activities and costs:

1. Maintain power train assembly

   A. Inspect main rotor hub assembly

      1) 35 mm slide demonstration "Inspecting the OH-58 helicopter main rotor hub assembly"

         Revision: Delete last 15 slides of a total of 60 slides.
         Cost: No cost for deletion

      2) Five page lecture "The rotor hub assembly"

         Revision: Record on audio tape.
         Cost: $.75 per cassette

   B. Disassemble main rotor hub assembly

      1) Diagram of main rotor hub assembly in Technical Manual 55-1520-228-20

         Revision: Double-sized reproduction drawing with color coding of blade assembly.
         Cost: $.06 each for over 1,000

2) 16 mm filmstrip "Disassembling the OH-58 main rotor"

Revision: Rewrite and re-record the entire script.
Cost: $110.00, rewrite; $1.35 per cassette, re-record

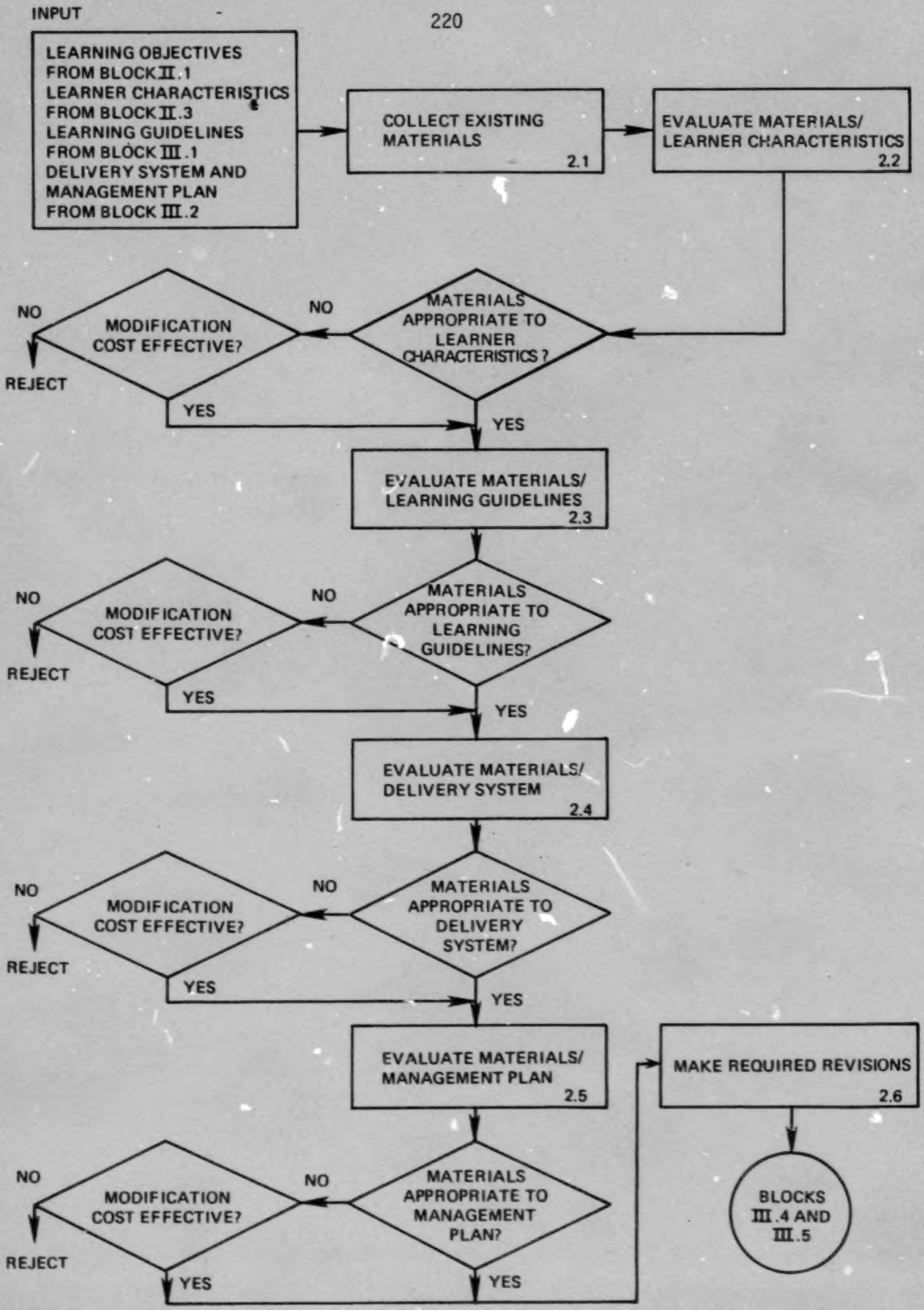
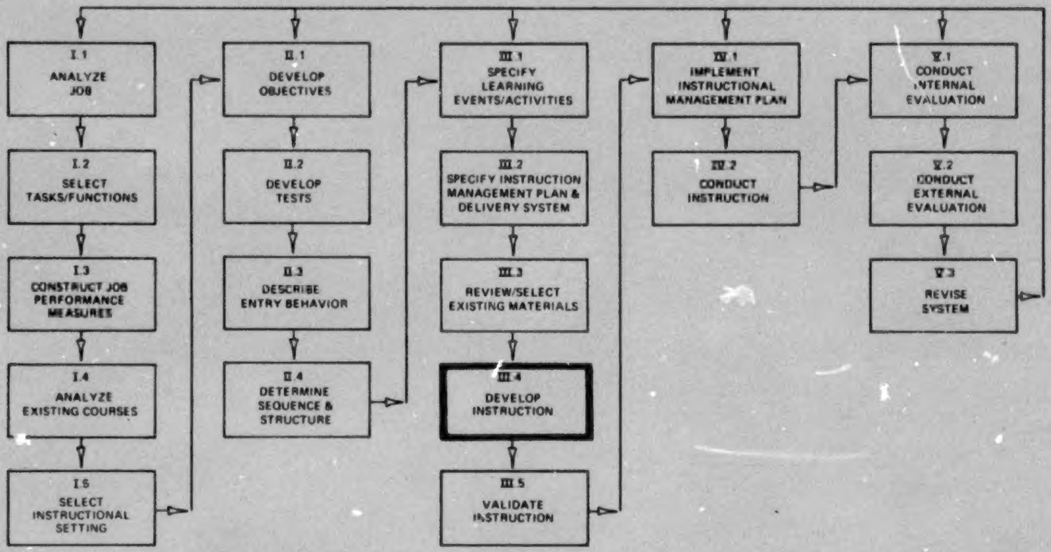

INPUT
LEARNING OBJECTIVES FROM BLOCK II.1
LEARNER CHARACTERISTICS FROM BLOCK II.3
LEARNING GUIDELINES FROM BLOCK III.1
DELIVERY SYSTEM AND MANAGEMENT PLAN FROM BLOCK III.2
COLLECT EXISTING MATERIALS 2.1
EVALUATE MATERIALS/ LEARNER CHARACTERISTICS 2.2
MATERIALS APPROPRIATE TO LEARNER CHARACTERISTICS?
NO
MODIFICATION COST EFFECTIVE?
NO
REJECT
YES
YES
EVALUATE MATERIALS/ LEARNING GUIDELINES 2.3
MATERIALS APPROPRIATE TO LEARNING GUIDELINES?
NO
MODIFICATION COST EFFECTIVE?
NO
REJECT
YES
YES
EVALUATE MATERIALS/ DELIVERY SYSTEM 2.4
MATERIALS APPROPRIATE TO DELIVERY SYSTEM?
NO
MODIFICATION COST EFFECTIVE?
NO
REJECT
YES
YES
EVALUATE MATERIALS/ MANAGEMENT PLAN 2.5
MATERIALS APPROPRIATE TO MANAGEMENT PLAN?
NO
MODIFICATION COST EFFECTIVE?
NO
REJECT
YES
YES
MAKE REQUIRED REVISIONS 2.6
BLOCKS III.4 AND III.5

FIGURE III.11: Flowchart of Block III.3: REVIEW/SELECT EXISTING MATERIALS

BLOCK III.4: DEVELOP INSTRUCTION


I.1 ANALYZE JOB
I.2 SELECT TASKS/FUNCTIONS
I.3 CONSTRUCT JOB PERFORMANCE MEASURES
I.4 ANALYZE EXISTING COURSES
I.5 SELECT INSTRUCTIONAL SETTING
II.1 DEVELOP OBJECTIVES
II.2 DEVELOP TESTS
II.3 DESCRIBE ENTRY BEHAVIOR
II.4 DETERMINE SEQUENCE & STRUCTURE
III.1 SPECIFY LEARNING EVENTS/ACTIVITIES
III.2 SPECIFY INSTRUCTION MANAGEMENT PLAN & DELIVERY SYSTEM
III.3 REVIEW/SELECT EXISTING MATERIALS
III.4 DEVELOP INSTRUCTION
III.5 VALIDATE INSTRUCTION
IV.1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV.2 CONDUCT INSTRUCTION
V.1 CONDUCT INTERNAL EVALUATION
V.2 CONDUCT EXTERNAL EVALUATION
V.3 REVISE SYSTEM

OVERVIEW

If there are no existing instructional materials that can adequately help students attain mastery of the learning objectives, or only partially suitable materials are available and these must be revised, it will be necessary to develop new instruction. The intent, in this block, is to assist the instructional designer in making the best use of available production facility personnel to produce instructional materials.

BLOCK III.4: DEVELOP INSTRUCTION

1.0 INTRODUCTION

In Block II.1, one or more learning objectives were derived for each task selected for training. In Block III.1, specific learning guidelines and learning events were identified that require different instructional treatment. In Block III.2, a certain management plan and delivery system was chosen for specific learning objectives. In Block III.3, existing materials were evaluated in an attempt to meet the instructional needs. After this reviewing and selecting from existing materials, one of the following two conditions probably exist:

1. There is no material already available that can adequately help students attain mastery of specific learning objectives, or
2. there is only partial material available and this must be revised and added to.

In either case, new instruction must be developed. The develop instruction stage of the ISD model is one of the most important in the entire instructional process. This is the point at which all the preceding analyses and planning will be utilized to produce the actual instructional products such as printed materials, TV programs, lectures or slides.

The development of instructional materials generally requires the efforts and skills of many individuals and groups. Some of these are:

1. subject matter specialists,
2. media specialists,

3. production staff,
4. writers, and
5. evaluators.

Extensive assistance from such experts will be required in developing various types of instructional materials. The primary purpose of this block is to give specific information on ways these professional personnel can help, and to outline what must be prepared and presented to such personnel if they are to help in the most efficient manner.

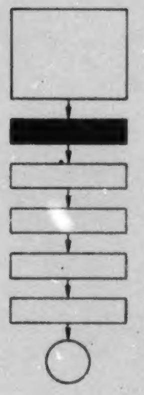
More specifically, this block is intended to help:

1. identify the general methods used to prepare instruction that will meet the learning objectives,
2. familiarize you with standard terms used by production facility personnel,
3. assist in giving clear instructions to the support group so they can best help in achieving the goals,
4. try out the developing materials so the quality of the final product can be improved, and
5. prepare adequate instructions for students who will be studying the materials and instructors who will manage the instructional program.

The steps in the procedure for developing instruction are shown in Figure III.12, the fold-out page at the end of this block.

2.0 PROCEDURES

2.1 Identify Instructional Needs and Constraints



Before beginning the development of instruction, you will, of course, need to know exactly what you are expected to accomplish. In ISD developed courses, a great deal of valuable information is available at this point. The most valuable items will be all the Learning Objective Analysis Worksheets used to document the major outputs of Blocks II.1, II.2, II.4, III.1, and III.2.

The Learning Objective Analysis Worksheets provide the following information:

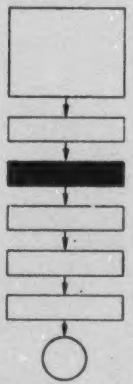
1. Learning objectives
2. Learning objective conditions
3. Learning objective standards
4. Test items for each objective
5. Reference to the task or element from which the learning objective was derived.
6. Learning objective sequence number and how objectives were structured
7. Learning category and sub-categories for each objective, along with reference to applicable learning guidelines
8. Applicable learning activities for each objective
9. Management plan and delivery system
10. Existing instruction selected

These Learning Objective Analysis Worksheets give most of what is needed to begin developing instruction. Some of the items, such as management plan and delivery system not only provide information, but also are constraints under which you must work.

In addition to the above, information will be needed as to approximate fund allocation, time constraints, personnel constraints, facility and equipment constraints, etc.

Before proceeding with the development of instructional materials, a final check should be made to insure that required resources definitely are available. It certainly would be ill-advised to plan for a certain format of instruction and then find that resources once thought to be available will not be available. The only alternative in this case is to reanalyze input data and choose an alternate approach consistent with the available resources and existing constraints.

2.2 Identify Available Resources



All military schools have available some kind of facilities for producing instructional materials. Typically, this includes a television capability, printing plant, training aid facility, and an audio-visual production facility. Specialized media preparation plants and model shops may not be available locally. However, the local unit can help make arrangements for special items when they are required.

Obtain copies of the production facilities documentation regarding development of classroom instruction, video instruction, audio instruction, slide-tape presentations, demonstrations, computer applications, and any other additional materials of this type. Local regulations or servicewide regulations may exist relative to the acceptable format for presenting materials for processing. Where these are available, be sure to obtain copies. Most of these publications have not been developed within an Instructional Systems Development Model context. While they may have to be adapted to your needs, they still should prove extremely helpful.

Find out how to get the subject content into a form that the production facility can easily use. For printed materials this may include length of typed lines permissible, page numbering locations, etc. For audio material, a script must be prepared in a format acceptable to narrators. Visual materials require storyboards, numbered lists of final order required, and an idea of what the final form will be--still slide, filmloop, video tapes, etc.

Find out how much assistance can be expected from the production facility. Get as much information as possible on how they would suggest developing the particular instruction. Production facility personnel require that ideas be presented in a form they can understand because that is what is used as the basis for judging their costs and their requirement for experienced personnel. From the description of planned new instruction, it will also be possible for them to give an elapsed time estimate. From this estimate, you may decide to accept some suggested alternatives thay may be almost as good, or perhaps better, than what was originally planned. Though general alternatives should have been selected in Block III.2, there are production alternatives as well.

The following list provides a general description of the functions of production personnel who likely will do most of the actual development of instructional materials.

1. Media Specialist (Consultant). Media specialists often oversee and direct media center personnel. The media specialist is usually knowledgeable in all areas of media selection, identification of unique media and stimulus characteristics, feasibility of different media for various instructional purposes, media production costs, use of hardware and accompanying software, and location of media software (re: films, television programs, etc.) on a wide variety of subjects. The media specialist may be particularly useful in helping to find existing materials in the content areas. The media specialist also should be able to provide valuable suggestions before the development of first draft materials has begun to save both time and money.

2. Graphic Artist. Since a large portion of media productions usually involves some artwork in the form of graphs, charts, diagrams, or pictures, the artist is another media professional whose assistance will be valuable. The graphic artist can usually be called upon to do a variety of illustrations of different sizes from small pamphlets to large poster size artwork. Most artists also can produce various sizes and styles of printed lettering. The graphic artist also probably can advise or give suggestions on the most effective way to visualize the instructional message. Usually an artist is capable of producing sketches in rough form which will be quite suitable for the production

of first draft materials.

3. Print Specialist. The print specialist is skilled in the development, arrangement, and production of a wide variety of print materials ranging from pamphlets and brochures to books. The print specialist can assist in deciding how to reproduce large amounts of material as economically as possible without undue sacrifice of quality. He will advise on the feasibility, cost, and preparation of various types of artwork in either color or black and white. In general this person should be consulted on any matter involving the production and duplication of printed materials.

4. Photographer. The photographer is capable of handling a wide variety of picture taking assignments and is versatile in developing and printing pictures. Much creative photography is done in the darkroom rather than with the camera; therefore, if any special photographic effects are needed, discuss it with the photographer. It would be helpful to show the photographer an actual example (from a past production or magazine pictures, etc.) of what is needed.

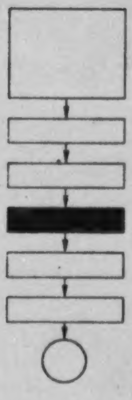
5. Audio Producer (engineer). The audio producer is responsible for producing audio tapes, audio cassettes and studio recordings. The producer knows what type of microphones are suitable for different applications. The audio producer can assist in all production phases but will be most helpful in preparing the final integration of the production where the narration, music, and other audio sounds are combined. The audio producer will make certain the audio production is crisp and clear with no unnecessary background noises or static and that music and voices are well modulated.

6. Writer. The writer is capable of either helping develop the scripts and written passages or taking the ideas and preparing a script. Before consulting a writer, have a very good idea of what is needed. The writer needs guidelines as to what content is needed in the production. Provide a rough script detailing specific content needed in the final production. Given this information, the writer will be able to develop a script.

7. TV Producer. The television producer is an expert in the conceptualization, development, production, and direction of television programs. If your plans call for producing a television program, the TV producer can give advice on how to plan it. You most likely will have to consult writers (if available), or seek the producer's help in writing a script. The TV producer usually "visualizes" the completed script--that is, decides on the camera shots and techniques to be used.

8. Technician. The (electronic) technician is a specialist in the repair and maintenance of electronic equipment such as audio consoles, video switchers, cameras, and tape recorders. The technician repairs equipment and is familiar with the reliability of different makes of audiovisual hardware. Before purchasing equipment, seek the technician's advice. It could save needless expense later on. The technician also can familiarize the instructional designer with the operation of production facility equipment. The technician also may be versed in the development of new equipment and in the reliability and technical problems with different makes of new "state of the art" equipment.

2.3 Develop Instruction



Following are details of developing various types of instruction to fit the chosen instructional setting, media selection, and management plan. At this point, a final commitment has not been made as to details of the final product. The final commitment should be made only after first drafts of rough materials have been evaluated and found to be effective. Details of this evaluation are discussed in the next section.

2.3.1 Writing an Audio-Only Script

The audio-only script is necessary for producing audio tape recordings, or live radio productions. Audio-only scripts are also prepared as part of instructional programs where, for example, learners may be listening to directions or explanations on an audio tape while they are performing or being guided through a task.

When developing audio scripts remember the limitations of the medium. The entire emphasis is on the audio, since there is no accompanying video. Use whatever techniques will stimulate the audio senses: music, sound effects, dramatizations, different voices, changes in pitch, tone, intensity of voice, and pacing. However, do not overuse a technique. Use them where needed and where they will contribute to the development of the instructional program. Take the script to an audio producer and ask his advice on how best to prepare and present the ideas that need to be presented.

Some guidelines for writing audio-only scripts are:

1. Examine each learning objective and learning step and write enough of an explanation to clarify each item. Consider what the intended audience already knows and their education level. Do not write more than is needed, you can always add more later after the first draft materials have been tested.
2. You now have a "bare bones" script. Check the script for continuity. Do the ideas flow or does the script seem disjointed? Read the script aloud to yourself and hear what it sounds like. If any part of the script sounds unclear or sparse, add or delete information where necessary. If possible, have someone read the script to you.
3. Decide on where changes in the pace of the presentation can best be used to highlight the script and maintain listener interest. Do not use Chinese gongs just for effect, but if they will add something relevant to the program, by all means use them. The idea here is to vary the pacing and content of the production without resorting to gimmickry. If you want to tell the audience what an air raid siren sounds like, do not describe its frequency and pitch. Instead, use a blast of a siren. Rather than simply explaining the contents of a speech, use a dramatization. Use appropriate music to bridge the gap between different parts of the program. When using music, remember the music should not attract undue attention but should complement the narration. The audience

should not concentrate on the music instead of the information in the program.

4. If pauses in certain parts of the script are necessary, indicate these on the script. If pacing, either faster or slower than the normal reading rate, is needed, indicate this on the script also.
5. When writing the final version of a script use the format shown in Figure III.13. The right side of the script contains all of the spoken narration that will be heard. The left side of the script is for specific directions such as adding music or sound effects.

After proceeding this far with the audio script, you are ready to take it to an audio producer to have it produced.

2.3.4 Preparing Video-Only Materials

There are two purposes of a video-only script. One is to provide guidelines in the development of isolated video materials (i.e., what scene a photographer should take, what the composition of a picture should be, what information a chart or diagramshould contain). The first purpose then is for the production of individual materials. The second purpose of a video-only script is for the production of sequences of materials. For example, to produce a slide program, a script outlining the sequence of pictures also is needed. (Alternate sequencing orders are listed in Appendix A.) The video-only script may be thought of as a set of prescriptions which define the exact criteria for the preparation of materials.

	Write the audio that will be read by the narrator on this side of the script.
Include any special directions on the left side of the script. These could be music, sound effects or any other outside sources which will be added to the final script.	
	Also, write any special directions for the narrator on this side of the script. For example, include changes in pace, tone or intensity of voice and indicate them in brackets [ ]. The part of the script to be read is written in capital letters, while the directions to the narrator are written in lower case letters.

FIGURE III.13: Format for an Audio Script

When developing a video-only script remember that all the information or factual material must be included in the picture or visual. Be sure to provide the photographer or graphic artist with enough information as to the composition of the visual. What details should be included? Is color necessary? What about the size of details? Should certain parts of a picture be photographed in close detail or magnified? Should the artist use arrows, numbers or other techniques to clearly delineate one part of a chart or graph from another part? Is lettering needed on the photographs or diagrams, and if so, what size?

Discuss exactly what is needed in each visual, whether it is a photograph or drawing, with the photographer or artist. The following steps will help when producing visual materials:

1. Examine each learning objective and learning step to determine what visual will explain it best. Draw a rough sketch which contains the needed detail to explain the visual. An artist is not required here. All that is needed is sufficient detail to communicate with the artist or photographer. Rough sketches or stick figures or the like are known as storyboards. When a sequence of them is mounted on a board, an outline of the sequence of a story can be illustrated. The storyboard pictures can be shown to an artist, photographer or film producer to give him an exact idea of the type of visuals to produce. While the preparation of a storyboard is preferred, an alternative is to write a detailed description of what content the visual should contain. More than one visual may be needed to adequately explain a learning objective or learning step. In any case, make sure the visuals for each learning objective or learning step do adequately explain the information. The important information must be contained in the

visual only since no audio explanation will accompany it.

2. If special colors, highlights, drawings, circles, arrows, blowups, or lettering are needed to adequately explain some part of the visual, indicate this on the rough sketch or written description of the visual.

2.3.4 The Audio-Visual Production

A large portion of the mediated materials designed will probably be some form of audio-visual production. Among the most often used audio-visual productions are the slide tape, television program, and film. The production of an audio-visual program is a job for skilled media professionals so work closely with production facilities personnel who have expertise in the area. The purpose of this section is to help design the audio-visual scripts so they communicate what is needed to the production personnel. Figure III.14 is an example of the audio-visual script format and Figure III.15 is an example of an audio-visual script.

Since audio-visual programs appeal to both the eye and the ear, there are common attributes among the different types of productions.

2.3.4.1 The Audio in Audio-Visual

In discussing the preparation of audio-only and video-only productions the important point was to derive the maximum benefit from a medium which appealed to only the sense of hearing or the sense of seeing. In combining the audio and visual media, there are some principles to follow to ensure they effectively communicate to both senses.

VIDEO

All the visual sequences of the program are written on this side of the script.

Storyboard pictures can be illustrated on this side of the script to correspond with the narration.

All narration and specific directions for the narrator are listed on this side of the script. In an audio-visual script all special directions that have anything to do with audio such as music are written on the right-hand side.

FIGURE III.14: Format for an Audio-Visual Script

Draft #_____ AUDIO-VISUAL SCRIPT

LESSON # 201-113-4602-F TITLE Radio Teletypewriter Communication Procedure PAGE 9

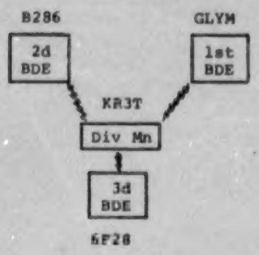
VISUALS	AUDIO
42. Print Copy: (5SP) (2CR) (LF) A2L7 DE KR3T  B286 2d BDE GLYM 1st BDE KR3T Div Mn 3d BDE 6F28 NET CALL A2L7	42. Your paper should look like this. (STOP)
43. Print Copy: "GO AHEAD" MACHINE FUNCTIONS	43. Complete the call by listing the prosign meaning "Go Ahead" and the end of line machine functions. (STOP)
44. Repeat Frame 42 only add: K (2CR) (LF) (after KRT3)	44. Does your call look like this? (STOP)
45. Repeat Frame 31. Arrows pointing to C3X6 and JP4L	45. Let's try another one. Select the net call sign and the call sign of the NCS. Then construct the preliminary call which the NCS would use to contact all the substations in his net by using a single call. (STOP)

FIGURE III.15: Sample Audio-Visual Script

1. Narration (audio) should be used to explain details, suggest relationships, or supply any kind of information that cannot be adequately explained in the visuals.
2. The narration should always be related to the visual being seen. The narration should not compete with the visual by describing or calling attention to details not in the visual. If in doubt, ask yourself "does the narration complement the visual?" If the answer is no then rewrite the narration until it does.
3. Use the narration to identify or describe the content of a visual as soon as the visual appears. Do not make the audience guess what the content of a visual is all about. Tell them.
4. Narration should always be simply written. Do not use long, complicated sentence structures with multiple clauses. Use a simple vocabulary. Try and strike a balance between brevity and simplicity without talking down to the audience.
5. Vary the pace of the narration: Allow for breaks of silence to bridge different visuals or use short musical bridges that serve to vary the pace of the program. But remember the music should complement the overall pace of the program. Do not use loud or boisterous music that will distract from the visual portion of the program.

2.3.3.2 The Visual in Audio-Visual

In designing the visual component of a production, it is important to visualize what it is you are trying to describe. The emphasis in the production of an audio-visual production is often on the visual; that is, the audio is used to describe the visual. However, the important point is that the visual and audio work together to present the desired information.

2.3.3.3 Producing a Slide-Tape Program

The slide-tape is one of the most widely used of all audio-visual productions because it is relatively inexpensive to make, elaborate equipment is not required, and it is not difficult to reproduce.

The slide-tape is simply a combination of slides accompanied by a tape recorded narration explaining and describing the slides. A synchronizing pulse is placed on the audio tape to synchronize the audio and the visual. The pulse is recorded on the tape by the audio producer or technician. It can be either audible for manually advancing the slides or inaudible and automatic.

1. No single visual (i.e., slide) should be on the screen too long. After approximately 20 seconds the audience tends to become bored and restless and easily distracted from the program. Remember this when planning the storyboard and avoid writing 40 seconds of narration for a visual that should not be on the screen longer than 20

seconds. If a longer time period is needed to explain a visual, a second similar visual can be planned to follow the first one. The second visual can be taken from another angle or be a different size than the first one. In any case, it should be different in some way but still be logically related to the first one. Also, try to vary the pacing of the program by having slides on the screen for different periods of time. When designing a program, do not think of technique first but do remain aware of the fact that the program should be lively and interesting.

2. To plan the production of a slide-tape program, prepare storyboards for each item of information. A storyboard is simply one or many cards or papers (see Figure III.16) which contain a rough sketch of the picture or visual to be photographed or drawn. In addition to the sketch, which should be placed at the top, write on the bottom of the storyboard the narration which will accompany the slide. If music is to accompany the slide indicate this also. The storyboard also should contain a number indicating what Learning Objective Analysis Worksheet each storyboard relates to.

3. Check the sequence of the storyboards. Visualize the sketches on each. Does each picture and accompanying narration follow a logical sequence? Are there any ambiguities or gaps where information is missing? If so, add more pictures or narration. Run through the sequence

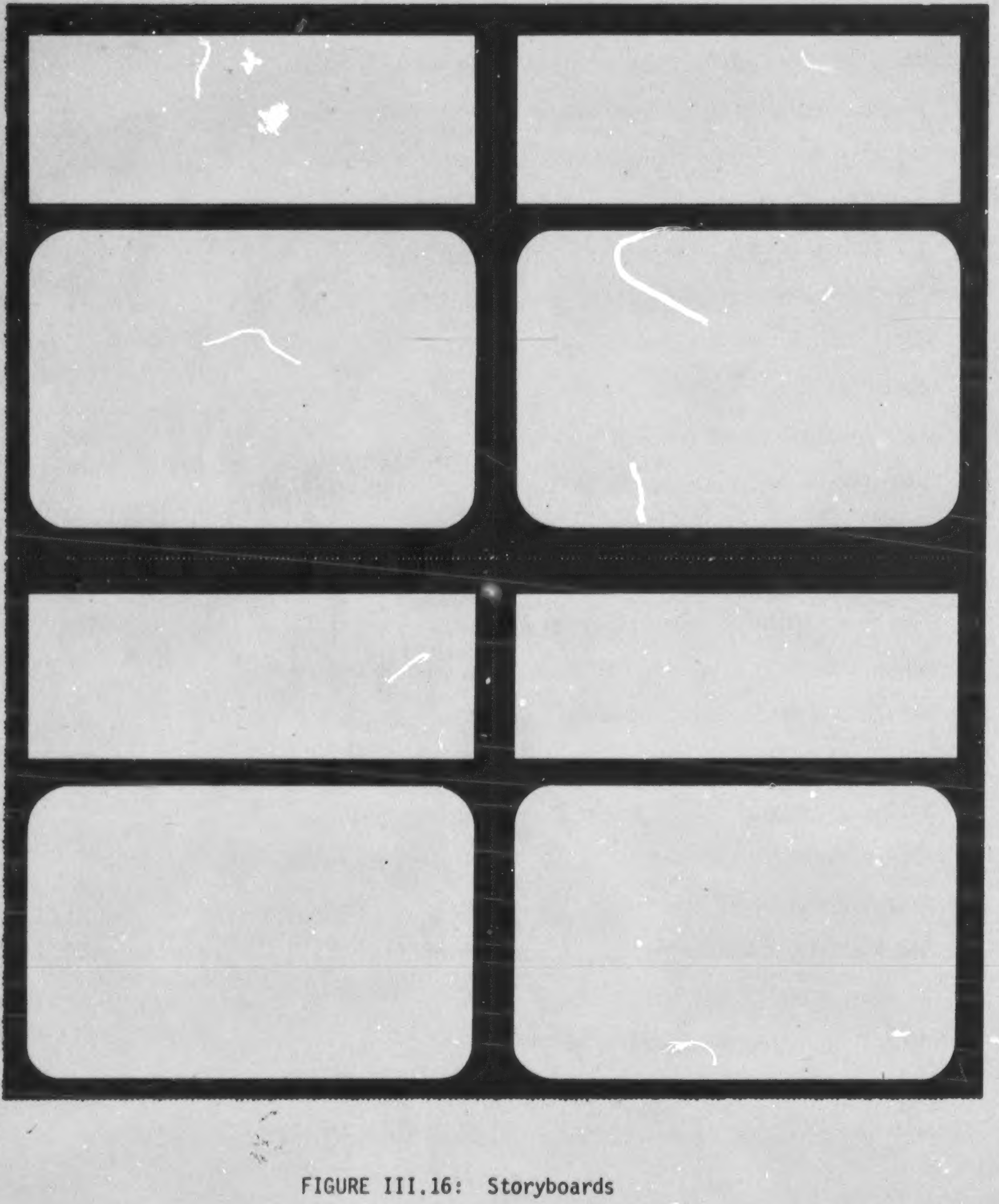


FIGURE III.16: Storyboards

several times to check the order. The combination of all storyboards forms the script for the slide-tape program. The visual should be detailed enough to provide a photographer with explicit directions as to the composition of the picture to be photographed or drawn by the artist. Ask another person to check the sequence of the storyboards. Someone else can often spot inconsistencies or ambiguities that the writer is not able to detect. Make any necessary changes. An example of a storyboard is shown in Figure III.17.

4. Take the storyboards to a photographer or an artist so that he can begin taking the photographs or doing the artwork. If the photographer has to take on-location shots it will probably be necessary to accompany him to the location. If he is to produce slides from books or magazines, provide him with all necessary materials. Storyboards should indicate the exact composition of every picture. If some of the slides require the production of graphs or diagrams, take these storyboards to the graphic artist. When the artist has drawn the visuals, take them to the photographer to have them photographed. You should now have all the visual components of the slide-tape program.

5. Next, write the audio portion of the script. To do this, simply copy the narration from each storyboard. This will be the completed audio script which can be taken to

WRITE A CONDITION PART

WRITE THE CONDITIONS FOR THE ACTION STATEMENT YOU JUST WROTE.

FIGURE III.17: Storyboard Frame

125

the audio producer who will arrange to have a narrator read the script.

6. The final production step is to indicate on the audio script where the slides should change; that is, how the slides should be synchronized with the audio. A small x, or any other mark at the appropriate points on the audio script will provide the audio producer with the required information for synchronizing the audio and visual components of the program. This should complete the production of the slide-tape program.

2.3.3.4 Film Production

Due to the complexity and high cost and time commitments involved in film production, there are very few valid reasons to undertake the production of a film. This is especially so considering the technology and state of the art of video-tape recording and editing which make the production of high quality television programs a most suitable alternative to film production.

2.3.3.5 Producing a Television Program

The production of a television program is the job of a television producer or director. Skilled professionals are needed to handle the numerous details and technical procedures necessary to produce a completed television program. Since television involves movement, audio, and video, the television programs should reflect the valid use of each of these elements.

The production of a television program involves a rather complicated set of procedures and techniques. Since conceptualizing how a television picture will look on the screen requires considerable expertise do not be concerned with describing camera shots, camera movements, lenses, scene transitions, or "blocking" in the script. This is the job of the television producer or director. A television producer develops a visual sense after many years of practice and experience so it would be unrealistic to expect to do the same in a short period of time. Your primary function in designing a media production is to communicate the specific requirements to the media professionals. This is accomplished by presenting the television producer with a completed storyboard so that he can visualize the program.

The process of developing a storyboard was explained in the section on slide-tape production, so it is not necessary to elaborate further. However, there are some differences between a slide storyboard and a storyboard suitable for a television production which are worth noting:

1. Television is not static; it involves movement. Remember this when writing the storyboard and do not plan for only static or still pictures.
2. When preparing a storyboard, describe in detail the composition of the required picture. Do not worry about technique, how it will be executed, or about using the right jargon. Leave that to the producer. If a close-up of a picture is needed to show detail, or if a large object needs to be viewed from far out, simply indicate this on the storyboard. The producer will decide the technical details.

3. Generally the visual will carry the important part of the message and the audio will be used to accompany and explain the video.
4. In planning each storyboard try to imagine how best to visualize the message that needs to be presented. Decide what would be the best picture or sequence of pictures to explain this information. Again, do not worry about the technique of how the program will be produced. Simply communicate on the storyboard what is required. The producer will take it from there.
5. When the set of storyboards is completed, check the sequence as explained before. The storyboards should now be taken to the producer.

2.3.4 Developing Printed Materials

Printed materials include printed words, art work, photographs, or some combination of these. The same guidelines given for audio-visual productions apply to developing printed art work and still photography.

Even though print is a relatively inexpensive medium, there are costs associated with each additional piece of information, both in terms of reproduction and student time to read it. Write all the student needs to know about each learning objective, but do not write one word more.

2.3.5 Developing Programmed Instruction

One good example of a systems approach to designing instruction is programmed instruction. Programmed instruction (PI) is characterized by presenting the student with information to which he has to make some kind of response before he can proceed further in the instruction. After each response the student is informed of his progress and he then proceeds in a similar manner through the entire program of instruction.

Following are some of the characteristics of programmed instruction:

1. All forms of PI are designed to involve the student actively in the process of learning. Instruction in a program is divided up into units called frames. A frame usually contains a small amount of information and a question for the student to answer based on the information in that frame. The question provides an opportunity for the student to actively respond. The student answers the question before proceeding to the next frame.
2. The next frame of instruction generally contains the correct answer to the question. The process of supplying immediate knowledge of results is known as feedback.
3. PI materials allow the student to proceed at his own speed or rate of learning. Students do not have to keep pace with other students in the class who may be receiving the same instruction.

The design of good effective PI is a complex procedure of activities which should be performed by skilled professionals. If you would like to attempt to design PI, refer to one of the excellent references listed at the end of this phase.

2.3.6 Developing Platform Lectures

Since the primary advantages of the platform lecture approach are the flexibility of content and the ease of providing a wide range of immediate feedback to students, the inputs to the lecturer should be outlines and aids rather than a rigid format. Following are some guidelines for materials that should be developed and presented to the lecturer.

1. The lecturer should be provided with the learning objectives to be covered and the test items that the students will be expected to complete as a result of what they learn from the lecture.
2. While the lecturer probably is a subject matter expert in his field, he should be provided with sources for all the information essential to the lecture.
3. Any audio-visual aids, demonstration objects, examples, suggested answers to students' questions, or other aids that can help in the delivery of an effective lecture should be provided.

2.3.7 Developing Self-Teaching Exportable Packages (STEPs)

STEPs may use a single medium or a combination of media. For example, audio-visuals, programmed instruction, and audio-only might be used in the same lesson or series of lessons. In general, the guidelines already given for developing instruction for the specific media are also applicable to STEPs. However, one additional precaution should be taken. Since the user of a STEP may not be able to get immediate or detailed assistance if he needs it, greater effort must be made to ensure that the instructional materials are clearly presented. The level of detail and the feedback to the trainee must be designed to include what is needed for the individuals with the lowest specified level of entry skills. When possible, self-administered and self-scored tests should be included to permit more competent trainees to skip elementary parts of the program.

Most STEP programs are broadly organized as follows:

1. Introduction
2. STEP learning objectives
3. Study resources
4. Practice exercise items
5. Discussion of practice exercise items
6. Self-evaluation test items
7. Discussion of self-evaluation test items

2.3.8 Developing Supplementary Instruction

Supplementary instruction is any instructional material (film, textbook, television program) which has been validated as providing effective supplementary instruction.

EXAMPLES

1. An excellent instructional program might already exist for performing maintenance on a particular piece of equipment. However, several minor modifications to the equipment may make additional instruction necessary. Rather than revise the existing information, a more economical approach may be to develop an adjunct program to provide the additional information.

2. When developing a new instructional program, several items of existing instructional material may have been located that cover 90 percent of the learning objectives. An adjunct program may be developed for the remaining 10 percent of the objectives.

3. A small group of closely related tasks may be performed by only a small percentage of a DOS. An adjunct program might be developed to supplement the existing program, and to be used only by those who need to perform the extra tasks.

Any of the media approaches discussed earlier may be used for supplementary instruction. Following are several guidelines for developing such programs:

1. Be sure the learning objectives to be covered by the supplementary instruction are carefully selected. These should be learning objectives that are inadequately covered or not covered at all by the existing instruction.
2. While redundant instruction should be avoided, some redundancy may be essential to provide continuity in the supplementary program.
3. Be sufficiently familiar with the instruction to be supplemented, to use a style and media approach with the adjunct program that complements the basic instructional program.
4. It is not essential to present all the supplementary materials at one time. Portions may be inserted into the total program whenever they are needed.

2.3.9 Developing Adjunct Programs

An adjunct program uses special directions plus existing instructional material (film, textbook, slide tape). It is developed by using the learning objectives, test items, and directions to guide the student to specific parts of the existing instruction. The adjunct instruction must then go through the same validating process describing in Block III.5. Sometimes students self-program instruction when given the objectives and resources.

Adjunct programming can be both effective and inexpensive while time for development is minimized.

EXAMPLE

Learning objective:
Using TM 38-750 and situations, determine whether a DA Form 2408-13 should be used.

Read TM 38-750 section 4-12, paragraphs a, b, c(1), and c(2) and answer the following questions:

.
.
.

Learning objective:
Using TM 38-750, fill in Block 17 (Faults and/or remarks).

Read TM 38-750 section 4-12, paragraph (3) and fill in your DA Form 2408-13 for the following situation:

.
.
.

2.3.10 Job Performance Aids (JPAs)

A JPA is a type of performance device, usually in the form of a written procedure with illustrations, charts, checklists, or tables of data. These materials are designed to provide information that does not have to be learned in the classroom or otherwise committed to memory. A JPA is used on the job as an aid or assistance in the performance of a task. JPAs are usually prepared for:

1. Behavior sequences that are long and complex
2. Tasks that are rarely performed
3. Tasks that involve readings and tolerances
4. Tasks that are aided by the presence of illustrations
5. Tasks that utilize reference information, such as tables, graphs, flowcharts, and schematics

As in the production of other forms of media, consult and use the services of installation experts in the production of JPAs, as well as the media experts who will produce the first draft materials. The following series of steps should be useful in the preparation of JPAs.

1. Verification of Activity Steps. Each step should contain only one simple operation or movement. Do not have too many compound procedures such as adjust..., then rotate..., then align..., then calibrate.... It would be better to list each of these steps individually. Each step should be the smallest component of the task. Experts often have shortcuts or other time and work saving techniques they use while performing a task. Often, after many years on a job they are not even aware of this. However, for the purpose of designing JPAs, identify every step, procedure, or operation necessary for a novice to perform the task. Work through the task following the list of steps. Proceed

from one step to the next. If "gaps" are apparent between steps or parts of a task cannot be performed because previous steps are not on the list (i.e., these may be expert's shortcuts) then adjust the list to include these steps.

2. Grouping of Steps into Units. One widely used type of JPA consists of written text and/or written text and illustrations. In performing most technical tasks where a technician has to manipulate, adjust or align equipment, the inclusion of pictures in a JPA is almost mandatory. As a general guideline, steps should be grouped into appropriate units. Each unit should consist of the appropriate number of steps necessary to complete that portion of the task. For example, if six separate steps are needed to align a tuner, these could be listed as one activity comprising the six individual steps. Or if nine calibrations are needed to align a piece of equipment, these could be grouped together. (See Figures III.18 and III.19 for examples.)

3. Production of JPAs. After steps are grouped together it is time to think of how the activities will be illustrated. Take the JPA work to a graphic artist who is skilled in the production of visuals for such purposes. Most installations usually have trained personnel who are capable of designing visual illustrations for JPAs. The most common and useful type of illustration is the "blowup" chart or diagram which is often referred to as an "exploded" diagram. These diagrams are simply expanded views of parts of sections of equipment that visually illustrate the list of steps comprising each activity. (See Figure III.20 for an example.) The diagrams are usually shown from several different views: front, right and/or left side, back. Different views are shown only if they are relevant to the performance

SLC

1. Set HOT and COLD Mixing Valve controls to OFF.
2. Connect Pressure Gauge to discharge.
3. Set COLD control to ON. Check that Pressure Gauge indicates between 59.9 and 60.1 PSI. If not, go to step 9.
4. Set COLD control to OFF. Disconnect guage, allow pressure to bleed off. Reconnect Pressure Gauge.
5. Set HOT control to ON. Check that Pressure Gauge indicates between 59.9 and 60.1 PSI. If not, go to step 21 (Action Tree for Symptom #1).
6. Set HOT control to OFF. Disconnect Pressure Gauge.
7. Set HOT control to ON. Place bulb end of thermometer in hot water discharge. Check that thermometer indicates between 130 and 140° F. If not, replace WH-1 and go to step 1.
8. Set HOT control to OFF.

CHECKOUT ENDS HERE

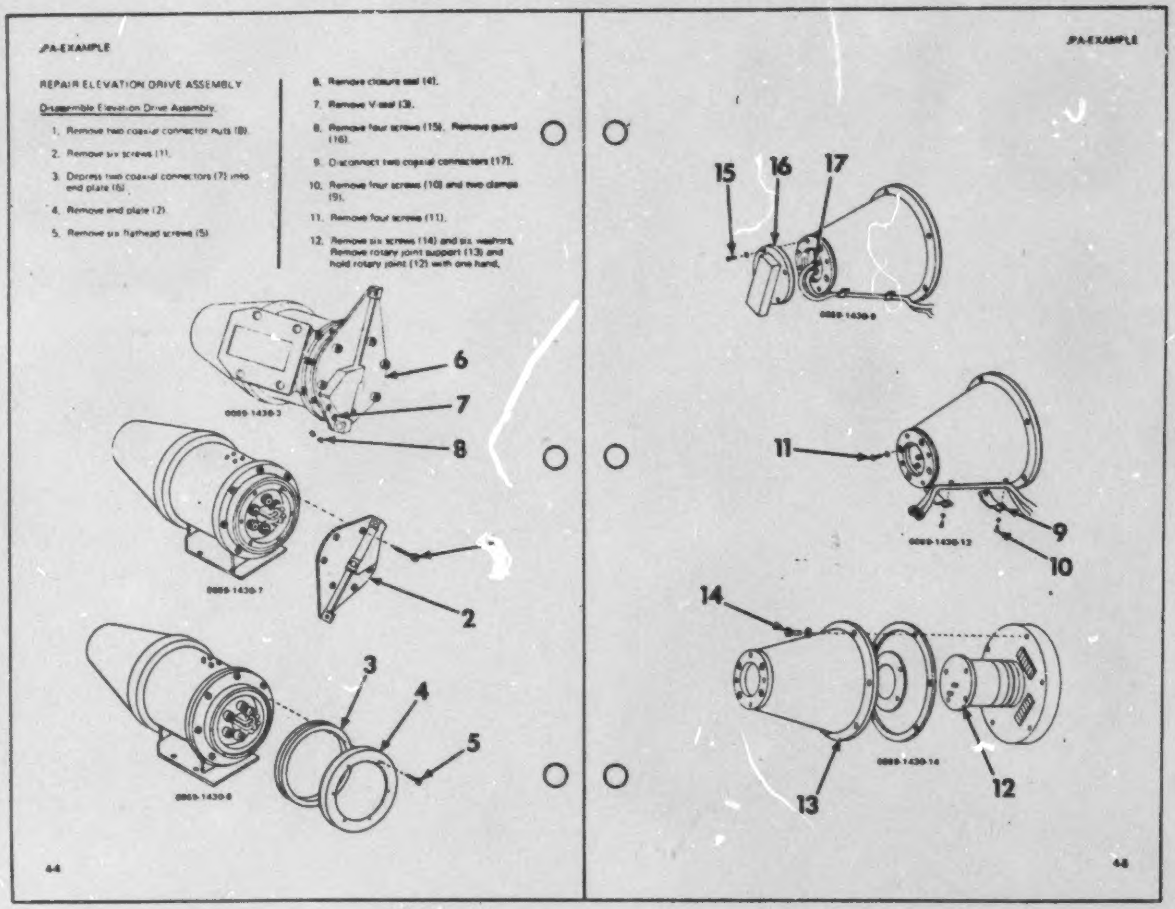
SPC

9. Set COLD control to OFF. Disconnect gauge, allow pressure to bleed off. Reconnect Pressure Gauge.
10. Set HOT control to ON. Check that Pressure Gauge indicates between 59.9 and 60.1 PSI. If not, go to (Action Tree for Symptom #4).
11. (This will be the first step in the Action Tree for Symptom #2.)

FIGURE III.18. Checkout Procedure for Illustrative Purposes

Component Name	Reference Designator	Related Outputs	Failure Modes	Outputs Affected and Nature of Change
Hot water heater	WH-1	Hot water at discharge	Water flow obstructed	Hot water - not available at discharge or low pressure
			Leaking	Hot water - not available or low hot water pressure
			Proper output temperature not maintained	Hot water - incorrect water temperature at discharge
Output line	P-2	Hot water at discharge	Obstructed	Hot water - not available or low pressure
			Leaking	Hot water - not available or low pressure
Cold water line	P-1	Cold water at discharge	Obstructed	Cold water - not available or low pressure
			Leaking	Cold water - not available or low pressure
Mixing valve	V-1	Hot and cold water at discharge	Hot water side obstructed	Hot water - not available or low pressure
			Hot water side leaking	Hot water - not available or low pressure
			Cold water side obstructed	Cold water - not available or low pressure
			Cold water side leaking	Cold water - not available or low pressure
			Outlet obstructed	All flow - not available or low pressure
			Outlet leaking	All flow - not available or low pressure

FIGURE III.19. Failure Mode Analysis for Illustrative Purposes



PA-EXAMPLE

REPAIR ELEVATION DRIVE ASSEMBLY

Disassemble Elevation Drive Assembly.

1. Remove two coaxial connector nuts (8).
2. Remove six screws (1).
3. Depress two coaxial connectors (7) into end plate (6).
4. Remove end plate (2).
5. Remove six flathead screws (5).
6. Remove closure seal (4).
7. Remove V-seal (3).
8. Remove four screws (15). Remove guard (16).
9. Disconnect two coaxial connectors (17).
10. Remove four screws (10) and two clamps (9).
11. Remove four screws (11).
12. Remove six screws (14) and six washers. Remove rotary joint support (13) and hold rotary joint (12) with one hand.

FIGURE III.20. Maintenance Frame with Illustrations Proper Size and Image Area Well Utilized

of the activity. Consult the reference manual listed at the end of this phase for examples of illustrating JPAs.

4. Check Draft JPA. Once a draft of the JPA is complete, ask someone else to work through it. This check will serve as a rough guide to determine if all the steps needed to perform the individual activities have been listed. If another person cannot meet the JPA objective, perhaps additional steps are needed, or additional illustrative visual aids are required.

2.3.11 Developing Formal On-The-Job Training (FOJT)

In FOJT, both the trainee and the instructor operate in the actual job environment. FOJT is usually carried out in the following way:

1. The tasks are explained to the trainee by the instructor. An "explanation," in this context, is usually both a verbal explanation and a demonstration of how the job is performed.
2. The trainee observes the instructor's demonstration and explanations.
3. The trainee may be required to describe the important features of the task as he observed them.
4. The trainee carries out all or part of the job task (depending on the amount of time needed to complete the entire task and the complexity of the task) under the instructor's guidance.
5. The trainee continues to perform the task, under an instructor's supervision, until he is proficient enough to perform the assigned tasks alone.

FOJT may be carried out either on the actual job site, under the actual production conditions, or, in a separate production area which is removed from the actual production line or process. However, in most cases, FOJT occurs on line utilizing ordinary production equipment and conducted by the shop supervisor.

The development of FOJT requires more than just running the student through the job. FOJT normally requires:

1. Instruction which is pre-planned following a systematic approach to designing instruction for a specific objective
2. Reasonable time limits to complete the training sequence
3. A schedule of specific job related performances which must be completed and approved before the trainee is considered trained
4. The administration of JPMs to determine if the trainee can perform the job to standards
5. Directions for the supervisor

In FOJT the student often must learn tasks "off line." It is often necessary to develop accompanying reading materials, manuals, or Job Performance Aids (JPAs). The student will sometimes spend time outside of the classroom reading and preparing for the FOJT where he will receive practical experience in the performance of a task. For example, the student may have to familiarize himself with charts, diagrams, JPAs, and manuals pertaining to the operation of equipment or systems before he begins FOJT. Then, while he is actually engaged in FOJT he may continue to consult these other sources as he progresses through the FOJT program.

FOJT is normally part of a progression through skill levels in various DOS. That is, without FOJT, there can be no promotion beyond a certain level. The FOJT is progressive; as the trainee develops more skill on a specific job and advances to a new job, he will undertake a new FOJT program.

When designing FOJT, it is important to realize that a task is not always taught or learned in the same order in which it is carried out under actual job conditions. Sometimes it is easier for a trainee to learn one task or skill before he learns another, even though the sequence used in learning the tasks is different from the sequence in which the tasks are performed on the job.

FOJT need not consist solely of the actual on-site job training. Stimulus materials such as charts, diagrams, slides, films or television programs displaying the job functions can all be used to advantage in FOJT.

The best method in designing an FOJT program is to use a thorough task analysis of the job with the assistance of a subject matter expert or a skilled professional on that job.

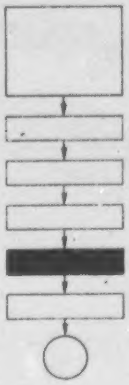
2.3.12 Other Forms of Mediated Instruction

The preparation of first draft materials discussed in this block represent the most often used media forms and instructional settings. There are, of course, other forms of instruction such as computer assisted instruction. The preparation of learning materials in this form requires very specialized skills and it is unlikely that you will design such materials.

But, regardless of the final media form in which the instruction is to be develivered, always follow the pre-production steps outlined in this block. By doing so, you will have a clear and detailed outline of a learning objective which can be put into final media form by the appropriate personnel.

After the first draft materials have been prepared the next step is to evaluate their effectiveness in accomplishing the learning objective(s). The information gathered in evaluating the instruction will be used to redesign it and produce the instruction in final form.

2.4 Pre-Test First Draft Materials



The purpose of designing first draft materials is to ensure that large amounts of time and money are not spent in the development of ineffective instructional materials. It is important to pre-test small amounts of instruction before large sections of first draft materials are tested, to determine their effectiveness.

One method of pre-testing first draft materials is to take a small meaningful unit of instruction of about 5-10 minutes duration and try it out on one student or trainee. The purpose of this pre-test is to locate ambiguous directions, inconsistencies, redundancies, etc. Try to locate errors at this point before larger units of first draft materials are designed.

If the student who tries out the instruction achieves correct responses to all questions and otherwise experiences no difficulties, the instruction may not be lean enough. That is, perhaps too much instruction has been put into the materials. In designing instruction it is advantageous to develop "lean" instruction or just enough instruction to teach an objective. Then, if the instruction proves to be ineffective in some area, more information can be added. Designing instruction in such a fashion ensures the efficient use of resources and most important, instruction that is effective in reaching the goals it was designed to achieve.

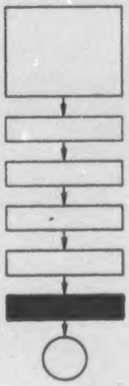
If the student who tries out the instruction experiences difficulties, it may be profitable to again test out the instruction, after revisions, on another student. Beyond practical considerations of time there is really no limit to the amount of pre-test tryouts that can be conducted until the instruction is successful. The techniques for testing/validating instruction are presented in Block III.5.

Design about 30 minutes of instruction or a small meaningful unit and then try it out. This instruction is what is referred to as "first draft." It consists of all the factual information cards (storyboard) that have been developed.

As a general rule, do not develop more than 30 minutes of instruction before you test it out to determine its effectiveness. What you should do is develop a meaningful unit of instruction. Obviously, what is needed is a unit or block of instruction that is designed to teach some portion of the objective. Remember that the 30 minute limit is a guideline and not to be interpreted as the absolute limit. Do not stop developing instructional materials when you reach 30 minutes, and then try and test something that is an incomplete unit and does not make sense to the student. If you develop a meaningful unit of instruction that takes 15, 20, or 25 minutes to teach, this too is fine. The main idea is not to get carried away developing sizeable portions of instruction without testing them out. This is simply an inefficient use of time and money.

After a small unit of instruction has been tried out and revised and first draft materials have been tried out and revised, the final revised storyboard information cards are ready to be produced in their appropriate media form and validated according to the procedures outlined in Block III.5.

2.5 Prepare User Instructions



After all instructional materials have been prepared and are ready for testing, write user instructions. The purpose of user instructions is to ensure that the course materials and management plan are used as they were designed to be used. User instructions, both teacher and student, must also be validated. Therefore the instructions you prepare are not yet considered to be in their final form. They will be tested and revised along with the instructional materials according to the methods and procedures discussed in Block III.5.

2.5.1 Prepare Instructor's Guide

The Instructor's Guide is a series of lesson guides that collectively outline the testing, teaching, and learning activities to be accomplished in a course of instruction. By carefully specifying the activities expected, the instructional designer should create a plan to coordinate both instructor and student activities with the outline of instruction in each lesson guide. Proper development of the

Instructor's Guide is important since the document will serve as the instructor's primary teaching aid.

All information that relates to the activities required for student achievement at a particular level of instruction should be outlined in the Instructor's Guide. This may include such activities as utilization of training devices, instructional materials, training aids and equipment, teaching techniques and methods, and demonstration exercises and applications that will collectively enhance the learning process. Additionally, basic facts about the course should be included. The following major categories of information can serve as a guide to the types of information that should be included:

1. Instruction description
2. Target population description
3. Testing information
4. System performance data
5. Administration directions

2.5.1.1 Instruction Description

The instruction description should include three major areas of information:

1. The rationale for the instruction,
2. An overview of what will be accomplished, and
3. A plan of instruction.

The rationale includes a statement of the purpose and scope of the instruction. It covers basic information such as what job the student will be prepared for, for whom the instruction is intended, and how far the instruction will take the student. An overview of the instruction should be included to give a broad picture of the entire program. The contents of each lesson or instructional block should be briefly reviewed in the proper sequence. A plan of instruction or a syllabus for each lesson should be included. It should contain the following information:

1. Learning objectives for each block or lesson
2. Duration of the training for each learning stage
3. Instructor requirements and duties
4. Media, resources, training aids, and/or facilities required

2.5.1.2 Target Population Description

The target population refers to the characteristics of the intended student users of the instructional materials. This information should have been previously defined as part of the ISD process. From the analysis, the following information about the target population should be extracted for inclusion in the Instructor's Guide:

1. Academic or educational level
2. Previous training or related knowledge and experience
3. Required physical and personal characteristics
4. Administrative restraints (i.e., required rank or grade)

2.5.1.3 Testing Information

The third important section of information to be included in the Instructor's Guide is the testing information. This includes tests for each module, unit, and lesson, all of which were developed earlier in the ISD process. Each test should be clearly labeled according to section and lesson. Answers should appear either on the tests or on a separate sheet of paper for reference by the instructor. Additionally, reference to the learning objectives tested by the items should be noted. It is also important to include clearly written directions for administering the tests. All tests must be administered according to the specifications dictated by the test designer. Following specified directions on administering a test insures that all students have the same advantage. One last consideration for inclusion in the section on tests is the evaluation of the tests. Rating, scoring, and weighting procedures should be explained and illustrated so that the instructor can properly determine the results of the students' tests.

2.5.1.4 Administration Directions

Directions for administering the course involve all details and directions for orienting the students to the training situation. This will include listing materials required by the students and directions on how the instructor can optimize training. The following lists some of the types of information that will enable the instructor to make maximum use of the training situation:

1. Scheduling procedures
2. Procedures for handling individual trainee differences
3. Monitoring processes
4. Procedures for keeping the student productively involved in the learning process
5. Recommendations for handling exceptionally fast or slow students
6. Recommendations for providing an environment conducive to learning
7. Teaching tips, methods, and techniques

2.5.2 Prepare Students' Guide

The amount of information required in the Students' Guide depends on the course management plan and on the complexity of the course. For a relatively simple instructor managed course, only minimum information will be required. On the other hand, for a correspondence course where the student never comes into direct contact with the instructor, quite extensive instructions will be required.

The major intent, in preparing a Students' Guide is to make sure the student has all the information he needs to proceed in an orderly manner through the course materials. Details of these instructions should provide answers to questions such as, but not limited to, the following:

1. When do I begin the course?
2. What do I do first?
3. What do I need in order to begin the course?
4. What am I supposed to accomplish?
5. How will I know if I have accomplished the objectives?
6. If I fail, how will I know what I did wrong?
7. What will I be able to do when I successfully complete the course?
8. What do I do if I do not understand the course materials?
9. What do I do if I do not understand some of the instructions?
10. The course seems to require some materials that I do not have, what do I do now?

3.0 OUTPUTS

The outputs of this block should include:

3.1 Products

1. The completed instructional program including all revised and developed materials.
2. Complete instruction for using the instruction (see examples).

3.2 Other Documentation

1. An outline statement of the instructional development plan
2. A summary statement of any deviations from plan, and reasons for the deviations
3. A final report identifying development costs, time, etc.

EXAMPLES

1. FOJT:

   See U.S. Army Signal School Signal Subcourse 000 (OJT Only), Radio Set AN/PRC - 77. (exerpts follow on pages 271-275.)

2. Study Cards:

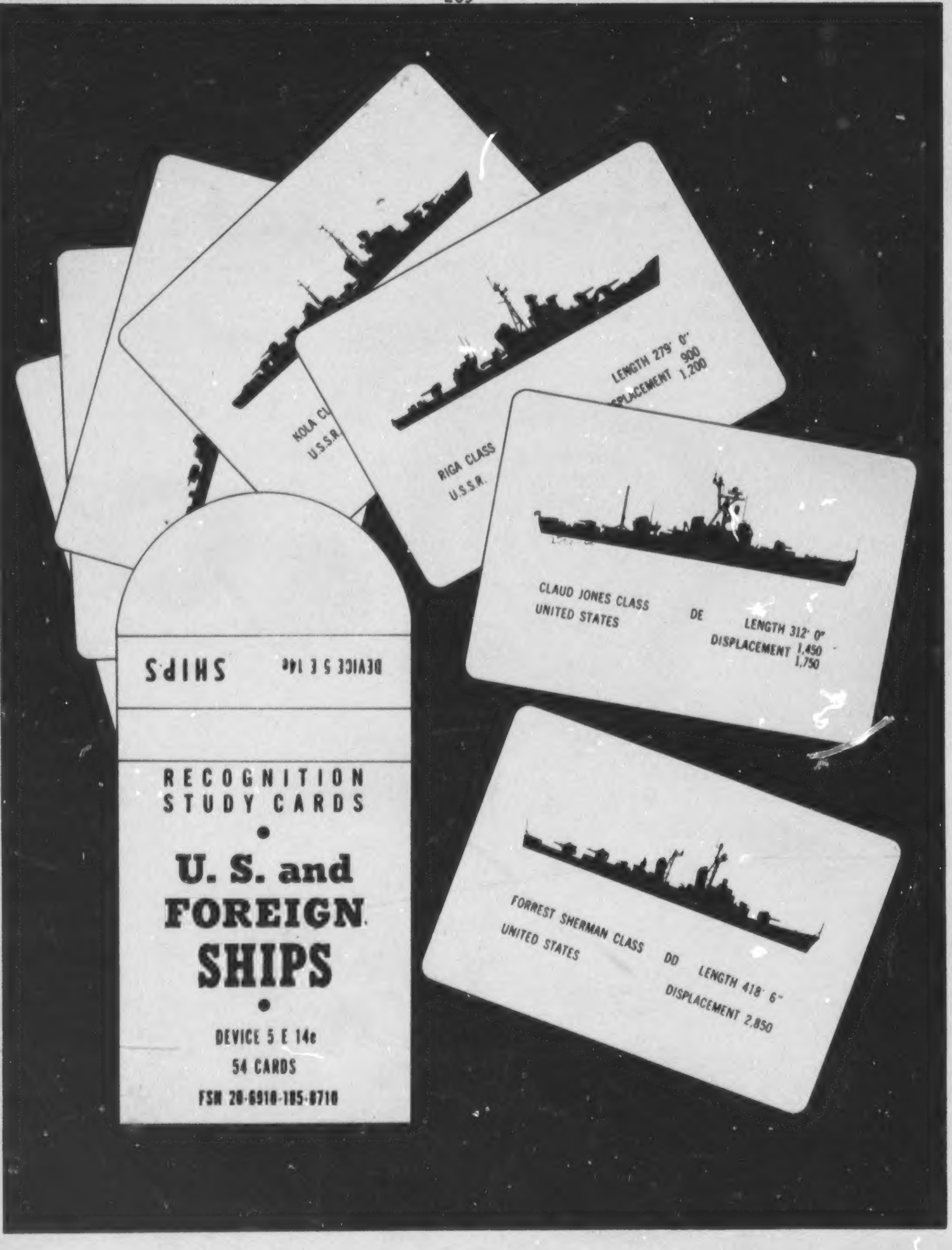
   For the learning objective on ship recognition, study cards were chosen in Block III.2. (See illustration on page 269.)

3. Audio-Visual:

   To continue with the Helicopter Maintenance example see TEC Bessler Que/See lesson No. 600-001-6651 F, "PMD Preparation nose cabin and Landing Gear," with student instruction sheet and administrators guide.

4. Print:

   Interservice Training on Construction Equipment series published by the U.S. Army Engineer School at Ft. Belvoir, Virginia, with Student Workbooks and Plan of Instruction.


KOLA CL
U.S.S.R.
LENGTH 279' 0"
SPLACEMENT 900
1,200
RIGA CLASS
U.S.S.R.
CLAUD JONES CLASS
UNITED STATES
DE
LENGTH 312' 0"
DISPLACEMENT 1,450
1,750
FORREST SHERMAN CLASS
UNITED STATES
DD
LENGTH 418' 6"
DISPLACEMENT 2,850
SHIPS
DEVICE 5 E 14e
RECOGNITION STUDY CARDS
U. S. and FOREIGN SHIPS
DEVICE 5 E 14e
54 CARDS
FSN 20-6910-185-8710

ARMY CORRESPONDENCE COURSE

US ARMY SIGNAL SCHOOL

FORT GORDON, GEORGIA 30905

SIGNAL SUBCOURSE 000 (OJT ONLY)

RADIO SET AN/PRC-77

SIGNAL SUBCOURSE 000 (OJT ONLY)

INTRODUCTION

This subcourse contains three lessons on Radio Set AN/PRC-77. These lessons will enable you to assemble and inspect the PRC-77, preset the PRC-77 to two specific frequencies, and to perform a complete operational check of the PRC-77. Each lesson has a performance text and there is no separate examination for the overall subcourse. You must correctly perform each task on all three performance tests to satisfactorily complete the subcourse.

This subcourse is to be administered by an appointed monitor who is knowledgeable or skilled in the subject matter which is covered. The monitor is responsible for certifying that the student has satisfactorily passed each performance test.

INFORMATION FOR UNIT COMMANDERS

Your cooperation and assistance is needed for the student to successfully complete this subcourse. You are to provide a monitor, who is knowledgeable or skilled in the subject matter, to supervise the OJT subcourse. You are also to provide the necessary equipment. A complete AN/PRC-77 and accessories is needed for this training. The student will be given credit for completion of this subcourse when you certify that the performance tests have been passed. Use the Lesson Verification Sheet and Subcourse Certification Letter contained in this subcourse booklet to certify this action. The Subcourse Certification Letter is to be mailed to the United States Army Signal School and the Lesson Verification Sheet should be included as an inclosure.

INFORMATION FOR STUDENT

THIS SUBCOURSE IS DESIGNED TO PROVIDE HANDS-ON TRAINING ON RADIO SET AN/PRC-77. THE LESSONS CONSIST OF PRACTICAL EXERCISES WHICH ARE PERFORMANCE ORIENTED. YOU MUST HAVE ACCESS TO RADIO SET AN/PRC-77 TO PERFORM THESE EXERCISES. YOU MUST ALSO WORK UNDER THE SUPERVISION OF A MONITOR. THE MONITOR WILL CERTIFY YOUR SUCCESSFUL COMPLETION OF THE OJT SUBCOURSE. SEE YOUR PLATOON LEADER TO MAKE ARRANGEMENTS TO HAVE ACCESS TO THE EQUIPMENT AND TO HAVE A MONITOR ASSIGNED TO CERTIFY YOUR TRAINING.

WHEN YOU HAVE FINISHED WORKING THROUGH EACH LESSON AND YOU ARE READY, ASK YOUR MONITOR TO GIVE YOU THE LESSON TEST. FIVE CREDIT HOURS WILL BE, AWARDED FOR SATISFACTORY COMPLETION OF THE SUBCOURSE WHEN THE LETTER OF CERTIFICATION IS RECEIVED AT USASIGS. BE SURE THAT THE LESSON VERIFICATION SHEET AND THE LETTER OF CERTIFICATION ARE PROPERLY FILLED OUT AND CONTAIN THE REQUIRED CERTIFYING SIGNATURES.

THIS SUBCOURSE DOES NOT HAVE TO BE COMPLETED WITHIN A SPECIFIC TIME PERIOD. IT IS TO BE COMPLETED AT THE CONVENIENCE OF THE MONITOR AND STUDENT, DEPENDING UPON THE AVAILABILITY OF THE EQUIPMENT.

LESSON 1

INSPECT, CLEAN, AND ASSEMBLE RADIO SET AN/PRC-77

OBJECTIVE

ACTION: AT THE END OF THIS LESSON YOU WILL BE ABLE TO INSPECT, CLEAN, AND ASSEMBLE RADIO SET AN/PRC-77.

CONDITIONS: YOU WILL HAVE A COMPLETE RADIO SET AN/PRC-77, TM 11-5820-667-12, AND THIS SUBCOURSE BOOKLET AND YOU WILL WORK UNDER THE SUPERVISION OF THE TEST MONITOR.

STANDARDS: WITHIN A TIME LIMIT OF 30 MINUTES YOU MUST BE ABLE TO INSPECT, CLEAN, AND ASSEMBLE THE AN/PRC-77. AFTER COMPLETING THE LESSON YOU WILL BE GIVEN TWO CHANCES TO PASS THE PERFORMANCE TEST BEFORE YOU WILL BE REQUIRED TO REPEAT THE COMPLETE LESSON.

INSTRUCTIONAL CONTENT

1. INTRODUCTION.

THE PRC-77 IS A SHORT RANGE, MAN-PACKED, PORTABLE RADIO RECEIVER TRANSMITTER USED FOR TWO WAY COMMUNICATION. IT IS IDENTICAL TO THE RADIO SET AN/PRC-25 EXCEPT THAT THE PRC-77 IS FULLY TRANSISTORIZED, HAS IMPROVED TRANSMISSION CAPABILITY AND CAN PROVIDE VOICE (X-MODE) TRANSMISSION. YOU ARE GOING TO LEARN HOW TO PERFORM SEVERAL TASKS ON THE PRC-77 DURING THIS LESSON, SO LET'S GET STARTED.

2. FIRST WE NEED TO CHECK THE ITEMS WHICH MAKE UP THE AN/PRC-77. THE ITEMS OF EQUIPMENT THAT MAKE UP THE AN/PRC-77 ARE SHOWN IN FIGURE 1.

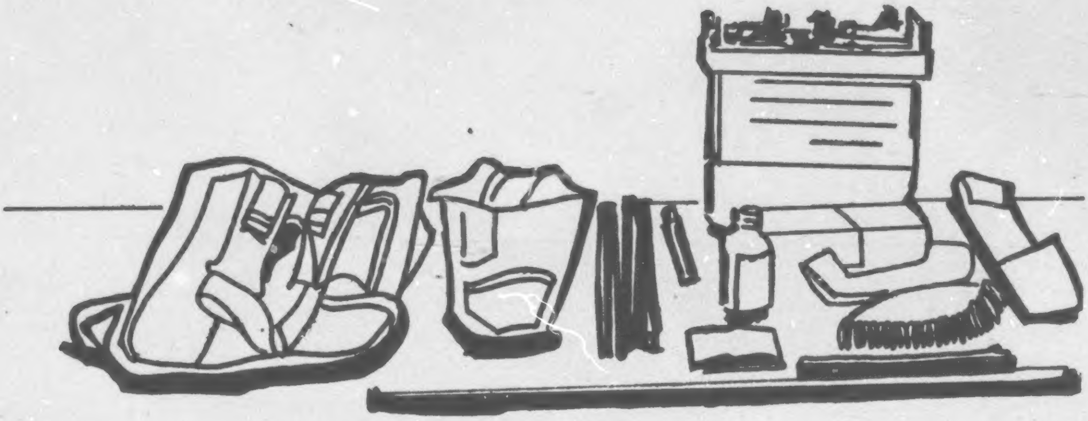


FIGURE 1

LAY THESE ITEMS OUT IN FRONT OF YOU. IN ADDITION TO THE ITEMS SHOWN, YOU WILL NEED A CLEAN SOFT CLOTH. YOU NATURALLY WANT TO MAKE CERTAIN THAT THE AN/PRC-77 IS CLEAN, COMPLETE AND THE PARTS ARE NOT DAMAGED. THIS WILL BE THE FIRST THING WE ARE GOING TO DO IN THIS LESSON.

CONTENTS

	PAGE
INTRODUCTION	1
INFORMATION FOR UNIT COMMANDERS	1
INFORMATION FOR STUDENT	2
LESSON 1 ... INSPECT, CLEAN AND ASSEMBLE RADIO SET AN/PRC-77	3
PERFORMANCE TEST	37
LESSON 2 ... OPERATIONAL CHECK OF RADIO SET AN/PRC-77	—
PERFORMANCE TEST	—
LESSON 3 ... PRESETTING FREQUENCIES ON RADIO SET AN/PRC-77	—
PERFORMANCE TEXT	—
LESSON VERIFICATION SHEET (OJT)	41
SUBCOURSE CERTIFICATION LETTER	42

SUBCOURSE CREDIT HOURS 5

APPENDIX A

1. Job Performance Order. One method of sequencing is in the order in which tasks and elements are performed. The learning sequence is the same as the job sequence. For example, a gunner may learn to load, aim, and then fire his weapon.
2. Chronological Order. The content of instruction flows from topic to topic on the basis of the order in which the events covered occurred in time. For example, recruits may be taught about World War I, then World War II, then the Korean War, and finally the war in Vietnam.
3. Cause and Effect Order. Learning objectives are sequenced from cause to effect. For example, the causes of low unit morale (poor leadership, inability to function as a team), may preceed the effects of low unit morale (absenteeism, motivation problems).
4 Critical Sequence. Learning objectives are ordered in terms of their relative importance. For example, a first aid course may address potentially fatal injuries, then permanently disabling injuries, and finally minor injuries.
5. Simple to Complex. Learning objectives may be sequenced in terms of increasing complexity. For example, marine navigation based on buoys and landmarks may be taught before navigation based on the location of stars or the angle of the sun.
6. Comparative Sequence. Familiar topics are considered before unfamiliar ones. Submariners should study familiar American submarines before attempting to study the more exotic midget submarines developed by Germany and Britain.
7. Reward Sequence. Unpleasant activities should preceed more pleasant activities. For example, the difficult and tedious objective

involving pre-setting the AN/PRC-77 radio should come before the enjoyable social activity of establishing communications with other stations.

You have undoubtedly noticed that several of these sequencing techniques are easily reversed. Learning objectives may be ordered in reverse chronological order, or from effect to cause, or from least critical to most critical. These are valid sequencing approaches and worthy of consideration. The best sequence is the one that works on the students for which it was designed.

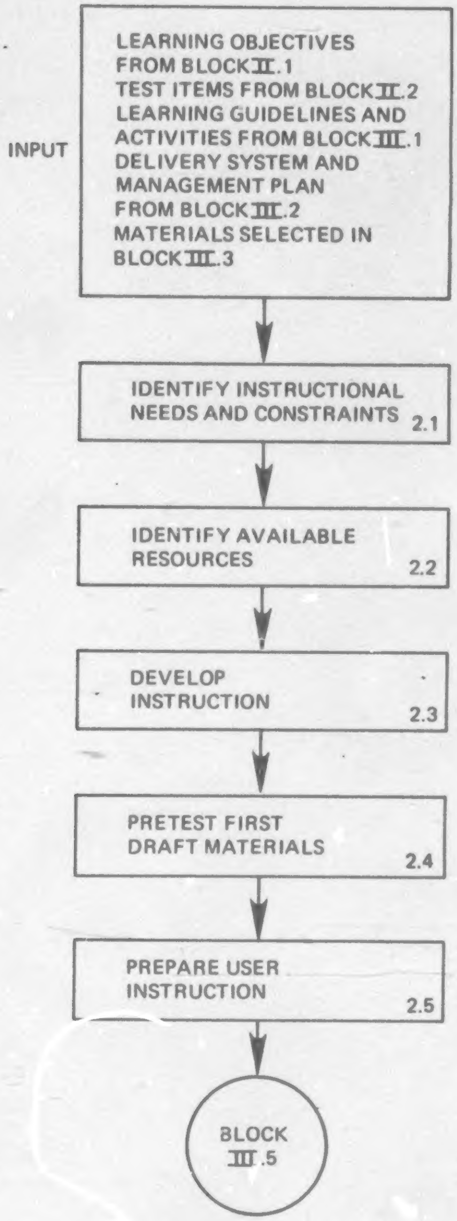
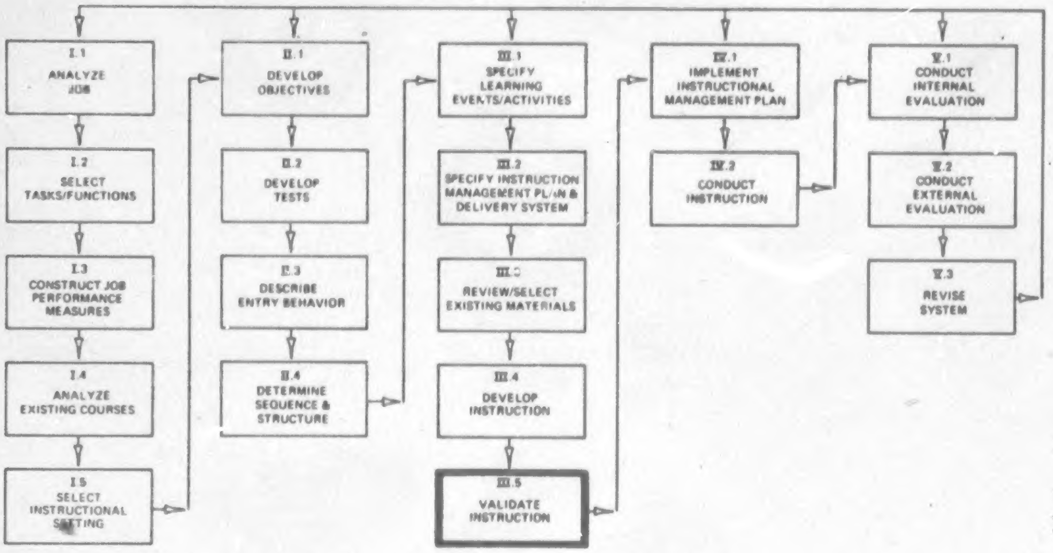

INPUT
LEARNING OBJECTIVES FROM BLOCK II.1
TEST ITEMS FROM BLOCK II.2
LEARNING GUIDELINES AND ACTIVITIES FROM BLOCK III.1
DELIVERY SYSTEM AND MANAGEMENT PLAN FROM BLOCK III.2
MATERIALS SELECTED IN BLOCK III.3
IDENTIFY INSTRUCTIONAL NEEDS AND CONSTRAINTS 2.1
IDENTIFY AVAILABLE RESOURCES 2.2
DEVELOP INSTRUCTION 2.3
PRETEST FIRST DRAFT MATERIALS 2.4
PREPARE USER INSTRUCTION 2.5
BLOCK III.5

FIGURE III.12: Flowchart of Block III.4: DEVELOP INSTRUCTION

BLOCK III.5: VALIDATE MATERIALS


I.1 ANALYZE JOB
I.2 SELECT TASKS/FUNCTIONS
I.3 CONSTRUCT JOB PERFORMANCE MEASURES
I.4 ANALYZE EXISTING COURSES
I.5 SELECT INSTRUCTIONAL SETTING
II.1 DEVELOP OBJECTIVES
II.2 DEVELOP TESTS
II.3 DESCRIBE ENTRY BEHAVIOR
II.4 DETERMINE SEQUENCE & STRUCTURE
III.1 SPECIFY LEARNING EVENTS/ACTIVITIES
III.2 SPECIFY INSTRUCTION MANAGEMENT PLAN & DELIVERY SYSTEM
III.3 REVIEW/SELECT EXISTING MATERIALS
III.4 DEVELOP INSTRUCTION
III.5 VALIDATE INSTRUCTION
IV.1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV.2 CONDUCT INSTRUCTION
V.1 CONDUCT INTERNAL EVALUATION
V.2 CONDUCT EXTERNAL EVALUATION
V.3 REVISE SYSTEM

OVERVIEW

The heart of the developmental phase is validating the instructional materials until the students who use the materials as planned meet the learning objectives. Validation is an iterative process and not a single point at which to measure success or failure. It is a formative evaluation; that is, it is part of the process of developing and improving the instructional materials and procedures.

VALIDATE INSTRUCTION

1.0 INTRODUCTION

There is a tendency among people who are being introduced to the ISD process for the first time to ask--"So what's new? As an instructor I have been doing all this for a long time." While there are many steps in the process which are unique to ISD, probably the most significant step which distinguishes ISD from other methods of instruction is the step of validating instruction. It is one of the few distinct steps in ISD where there is a clear distinction between art and technology--and validating instruction is definitely a technology.

The validation process (often called formative evaluation), if properly followed, will ensure that instruction works. That is, it will ensure that members of the target population will achieve the objectives after instruction. This is a strong claim. However, no other technique has been reported in the literature that consistently ensures results in all kinds of courses, for all kinds of trainees, in virtually all kinds of circumstances. Further, there is nothing mystical about validating instruction and people can learn to do it with only a modest amount of training. In a sense, it resembles the method of adjusting artillery fire by the bracketing process. Fire, and adjust. Fire, and adjust. The process is repeated until there is fire for effect, then adjusted again until the target is hit.

By the time instruction is ready for validation, many things have become fairly clear: What the learning objectives and tests are like, what the instructional materials are like, how the instruction is intended to produce the expected results, and the characteristics of the target population for whom the instruction is intended. What remains to be done is to try out the instruction on members of the target population and revise it until it works--until the trainees achieve the learning objectives.

The most important single assumption made in this block probably will be the most difficult for people new to the ISD process to understand and accept:

> THE FIRST TRYOUT OF A LESSON OR MATERIALS
> SHOULD REVEAL AN ABUNDANCE OF ERRORS; IT
> SHOULD NEVER PASS WITH FLYING COLORS.

If it sounds like this step in the ISD process is one in which you plan ahead to fail, this is true to a point. The necessity for producing inadequate instruction on the first trial is caused by a peculiarity in the measurement process. While it is relatively easy to detect and revise instruction that only partially meets the requirements, it is virtually impossible to identify and revise instruction that grossly exceeds the requirements. It is possible to identify too little instruction, but not possible to obtain data that enables one to conclude there is too much.

A thorough understanding of this point is essential to the correct application of the ISD process. The importance of this point is further emphasized by costs. It is far more expensive to try to eliminate portions of instruction that have already been developed and designed into the program than it is to add small amounts of additional instruction where it is found to be needed based on tryouts.

You might ask, if the validation process is so good, why are people just now getting around to using it. The answer would be that many people have been using it for years; however, two important factors are now making its use much more widespread. First, the strong pressure to produce more and better instruction has forced instructional designers to look for more and better tools. And the validation process provides a very powerful tool. Second, hopefully enough has been learned about the validation process to do a more effective job of teaching others how to use it.

Very few, if any, ISD professionals have the ability to look at instruction of any kind and tell whether it was produced by ISD or by a traditional process. If you walked into a lecture class or a demonstration, or examined manuals, TV tapes, or other learning materials, you would be unable to tell by looking at the object itself, whether it was properly designed by ISD or simply selected on the basis of someone's personal opinion. This statement is extremely important because the typical method of examining or "inspecting" instruction is one of having "experts" look or listen to the instruction and then offer their personal opinion of its adequacy. The supervisor goes into the classroom and observes the instructor going through a well-rehearsed presentation, then he makes out an evaluation form.

Unfortunately, this personal opinion method of examining or inspecting instruction is a tendency, a strong practice, and is called for by regulation and doctrine. It does not constitute an adequate measurement of the variables in the instructional setting. If the purpose of instruction is to change the behavior of the students, determination of whether or not that purpose has been met cannot be made on the basis of observation of the materials and presentations. The only known way that it can be done is to examine in detail the responses of the learners on the criterion tests. If they have learned,as a result of the instruction, the instruction must be working, and if they have not learned, the instruction--no matter how polished and powerful it appeared--must not be working.

This is a difficult position to accept because all of us think of ourselves as judges of "good" instruction--materials, films, etc.--and to be told that these judgements are not valid and reliable is a sort of slap in the professional face. Typically, instructional developers have been taught and have come to accept the notion that if the students did not learn, the students were somehow at fault. That was a convenient rationalization. Unfortunately, it is no longer an acceptable excuse for failing. The people in the target population are the only people we have to work with, and if we are unable to teach them what they need to know in order to perform, the instruction is at fault and must be revised. The validation process is the method by which the instructional developer makes instruction work.

As was said earlier, the instruction should have been designed to be barely acceptable or barely unacceptable, with the preference going to the latter. It should be tried sequentially on increasingly larger groups. The purpose of the individual, small, and large group trials is to find and eliminate errors and inadequate or wrong instruction. Since it is assumed that there will be a large number of errors or problems in the early versions of the instruction, the tryout procedure is designed to take advantage of the notion that the more errors you have to find, the fewer students you will need to find them.

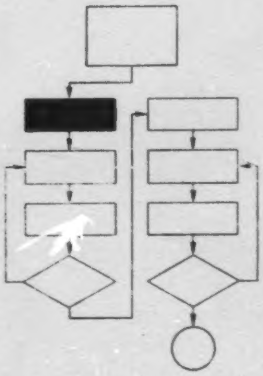
There is a good reason for this. Errors and problems in instructional materials are usually not unique to single individuals. Suppose an instructional sequence was available in which there were fifty problems (errors). Some of the problems are normally so obvious that all students will make the same mistake. If all students would have made that mistake, only one student is needed to find it. As individual students go through the materials they gradually eliminate all the obvious problems, and more students are needed to find the remaining ones. So, a few more students are added for the small group trials. By the end of the small group trials all the errors and problems that can be found by using small groups have been found and corrected. At this point, a larger group of people is needed to find any more errors or problems that may exist.

This procedural order, fortunately, is very cost-effective. The early versions of the materials can be fairly rough and still provide good data, eliminating the need for expensive final draft artwork and editorial efforts.

The steps in validating materials are shown in Figure III.21, the fold-out page at the end of this block.

2.0 PROCEDURES

2.1 Develop Plan for Individual Trials



The validation procedure requires that all instruction be tested with students before it is used in actual course settings. Clearly, this is the recommended procedure. However, the realities of day-to-day management often require adjustments and modifications of procedures. If there is an intense need for trainees in the field and it would be possible to begin a training cycle using untested materials, some circumstances could justify this approach.

First, there would have to be enough instructors to provide additional opportunities for students to receive help. Second, students should have the opportunity to be retested on any materials they failed to master the first time. Third, the materials will be revised based on the data collected during the first class or group of actual students.

The necessity to use such a procedure will often arise when there are insufficient members of the target population available to do reasonable testing prior to the time the actual trainees arrive. Remember, the groups which are used in the validation process define the target population for the materials. If no members are available for testing, better long term results could be obtained by revising after the first true members of the population are available. However, whenever possible, the procedures covered next should be followed.

When a course is under development, the materials and instruction normally will be developed in the same sequence that they will be used, particularly if subsequent segments or units depend on mastery of the earlier materials. If there is a sequence, how is it known when to start the tryout process? There is no universal answer for this question. However, there are some guidelines which should be helpful in making decisions.

1. If the developers have not worked in the area before, it is probably a good idea to try out early and frequently until you learn the

likely problem areas. Perhaps testing the first thirty minutes of instruction is a good approach. The unit of instruction should, however, be large enough and complete enough to make sense alone.

2. Later in the developmental process, you may safely wait until a larger amount of material has been developed, but not more than can be comfortably done by a student in one sitting.

3. When the materials are hierarchically related, you will have to insure that the student has mastered all of the early dependent segments before he takes the later segments. This may mean you will have to bring all the students up to criterion on the early lessons before the later ones can be started. This is a very difficult and time consuming process.

4. It is difficult for an individual student to complete more than four lessons in one day (one-half to one hour in length) as a part of a tryout effort. This is not an absolute rule, just an approximation based on experience.

5. If lessons are independent, you can reasonably test more of them in one day than you can if they are dependent. Still, it is probably best to test only one or two on the same students unless there is a real difficulty in obtaining test students.

2.1.1 Select or Develop Data Collection and Recording System

The purpose of the trials are to find out information about the students, the materials, and the procedures. You must have a system for collecting and recording the data so that decisions can be made based on the data. There is no point in collecting particular data unless you intend to use it. Start with a list of all the decisions to be made, then the kinds of information needed to make them. Decide how to collect and display the information, and finally, decide how to analyze the data. Usually you will need data such as background information on students, (Figure III.22), pretests (Figure III.23), entry level tests, attitude measures (Figure III.24), within-course test items or responses, validator's comments to students (Figure III.25), student questions and remarks (Figure III.25), length of time required on different parts of the instructional program (Figure III.25), posttests, and interviews (Figure III.26).

2.1.2 Select or Develop Attitude Measures

The attitudes you are interested in may vary widely. They may be simply whether the students liked or disliked the subject matter. Or, they can include usefulness of the medium, or feelings about the medium, the procedures, or the length. Do not measure an attitude just for its own sake. Measure only those on which decisions or revisions will be made. Figure III.24 shows an example of attitude scales.

If you want to determine whether the students feel the course is too long or too difficult, word the items so the students can respond in a range of ways. Provide for positive, negative and neutral positions. Both the student and the scorer need to be able to tell whether it is a positive or a negative response.

NAME ______________________________ GRADE E ________
(Last) (First) (MI)

EDUCATION - HIGH SCHOOL ____________________ COLLEGE ________
(Number of Years Completed)

TIME IN SERVICE ____________ ____________
(Years) (Months)

COMPLETED BASIC TRAINING: YES ____ NO ____
(Check One)

PRESENT DOS ______________ TIME IN DOS ____________ ____________
(Years) (Months)

TITLE OF YOUR PRESENT JOB ______________________________

TIME IN PRESENT JOB ____________ ____________ ____________
(Years) (Months) (Days)

SECONDARY DOS ______________________________
(If None, Leave Blank)

SCHOOL TRAINED IN SECONDARY DOS: YES ____ NO ____
(Check One)

FIGURE III.22: Background Information Sheet

ANSWER SHEET 1 & 2
PRE/POST

	U.S.	British	French	German	Soviet
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					

FIGURE III.23: Pre/Posttest Answer Sheet

ACTIVITY EVALUATION FORM

Date________________

Activity (check one and write in the title):

___Lecture____

___Game ____

___STEP____

___Exercise____

___Discussion_______________________________________

___Student Presentation_____________________________

___Other____

Please mark your response to each statement with an "x" at the appropriate place on the scale.

1. The activity helped me achieve the criterion on the learning objectives.

   Yes   Some Help   No

   |--------|--------|--------|--------|

2. From the activity, I learned skills that I expect to use on my job.

   Yes   Maybe   No

   |--------|--------|--------|--------|

3. This activity was:

   Too Simple   Average   Too Complicated

   |--------|--------|--------|--------|

4a. I would have preferred an alternate activity to achieve the same learning objectives.

   Yes   Maybe   No

   |--------|--------|--------|--------|

4b. What would you have preferred?___________________________

____

FIGURE III.24: Attitude Measure

LESSON TITLE AND NUMBER ______________________ TOTAL TIME __________

Frame or Unit Number	Type of Frame	Time	Student Response or Comment	Validator Comment or Explanation	

FIGURE III.25: Within-Course Response and Comment Sheet

INDIVIDUAL POST-LESSON INTERVIEW
(For a slide/tape lesson)

Questions	Responses
1. How was the lesson's pace:	Fast____ Slow____ OK____ ?
2. How was the visual art:	OK_____ Not OK_____ ?
3. Were the words:	Confusing____ Clear___ ?
4. How was the narrator:	OK_____ Not OK_____ ?
5. How were the procedures:	Confusing____ Clear___ ?
6. Did you find the words on the visuals:	Bothersome____ OK_____ ?
7. Was it a boring lesson:	Yes_______ No_______ ?
8. Did you feel "pressure":	Yes_______ No_______ ?
9. Do you think platform instruction would be:	Better___ Worse___ Same___ ?
10. Were the practice exercises:	Too many _______ Too few _______ About right_____
11. How confident of your performance are you:	Very_____ Little_____ (Degree ________________)

12. Do you have any general overall statements about the entire lesson experience?____

____

____

FIGURE III.26: Post Lesson Interview

EXAMPLE

Amount of required revision to improve usefulness:

1	2	3	4	5
very high	high	satisfactory neutral	low	very low

The students were unable to determine whether a "high" meant that much revision was required, or the "high" was a positive meaning that it was adequate and needed little, if any, revision.

To help make optimum use of the attitude measures, develop a participant debriefing interview. Immediately after completing the lesson, the student is a good source of information about how he feels about the lesson. Ask him about problems he had with any parts of the lesson. A partial list of possible questions is shown in the following example.

EXAMPLE

1. What were the most difficult parts of the lesson for you?
2. Do you have any ideas on how to make any of those parts easier or clearer?
3. What parts of the posttest were difficult for you?
4. Did you have problems on the same parts of the lesson?
5. Was the test different from the lesson? How?
6. What was the best feature of the lesson?
7. What was the worst feature of the lesson?

In addition to questions that apply to most lessons, which can be prepared in advance, note things during the trial that you want to ask the student. Write them down and add them to the debriefing as the lesson goes along, or while the student is taking the posttest.

Since each lesson is unique, there is little likelihood that a standardized form can be used for all lessons. Remember, these are all working documents, not control documents. In addition to written instruments, some data may be collected on audio or video tape.

2.1.3 Develop Data Analysis Plan

No data has any value unless they are usable and used. For individual trials, you usually are dealing with detailed information from a few people. For each piece of data to be collected, decide what it will tell. If you ask the students if the lesson was too long, too short, or just right and they all say "too short"--what are you going to do with that? You need to determine ahead of time how you will make decisions based on the summarized data. If you do not know how the data will be used, you probably do not need to collect it.

In Block II.2, test items were developed to decide whether a student had or had not mastered each learning objective. These tests were consistent with the behavior, conditions, and standards of the learning objectives developed in Block II.1. Those learning objectives and tests are now to be used in determining whether the instructional materials are adequate. You must decide in this block how good the instruction must be before it will be implemented in the field.

How good it must be will depend on a wide variety of considerations, such as the following:

1. If there will be much instructional support, additional or alternative materials, many instructors, ample time, etc., the instruction does not have to meet as high a standard as when it must stand alone.

2. If the course will only be offered once to each student and the need is for a high proportion passing, the materials must be much better than if the need is only for a low proportion passing.

3. If the student has many opportunities to repeat instruction and tests, or alternative instruction and tests, the standards do not have to be as high as if he does not have the chance to repeat.

4. The standards set for instruction will depend to a large extent on how decisions will be made to graduate students from the course. If the student must take a complete course mastery examination upon completion of instruction, standards must be higher than if he must pass only a part of the objectives.

Remember that in this block you are trying to improve the instruction so that a sufficiently high percentage of students will meet the criteria on the posttest their first time through the course. You are not deciding the percentage of students that will eventually meet all the course objectives.

The higher you set the standards for the instruction, the more expensive it will be and the longer it will take to have the course operational. If you want 80 percent of the students to meet the criterion the first time the instruction is offered, it will cost considerably more than if you can be satisfied with 70 percent. Further, if the standards are set as high as 90 percent, it will take much longer and cost more than to accept 80 percent. It takes more effort and time to move from 80 percent to 90 percent than it does from 70 percent to 80 percent. This is a finding that is totally consistent with quality control data from other disciplines.

Remember that the standard for each learning objective was established in Phase II. Unless there are serious reasons to question those criteria here, they should be accepted as good working numbers, even though they may have been more or less arbitrarily picked when they were written in II.2. Later, as data are accumulated, it may be reasonable to discuss with the test writers the advantages and disadvantages of changing the criterion on any, or all, of the objectives. This discussion should be based on experience gained in the tryouts.

Within-course tests present a different problem. You may develop a sliding scale of standards from within-course tests to the posttest. For example, while the posttest will need to reflect the original, or revised, learning objective standard, you may have several tests within the course prior to the posttest. On these within-course tests, you may accept a lower level of performance in the earlier tests, with the acceptable level being raised on subsequent tests until the actual learning objective standard is reached on the final test.

2.1.4 Develop Plan for Conducting Instruction

Plan all the events, but be prepared for unexpected contingencies such as missing equipment or participants, or too many distracting observers. An example of a procedure outline is:

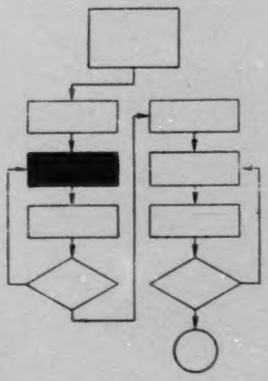
1. Explain role of participant to him.
2. Have participant fill in background sheets.
3. Have participant take entry level test.
4. Check it.
5. Have participant take pretest.
6. Check it.

7. If the results in either 4 or 6 indicate the participant is not from your target audience, select another participant.
8. Start lesson.
9. Record all the information as you planned.
10. Administer posttest.
11. Debrief the participant.

2.1.5 Select Participants

The participants you use will have a tremendous impact on the learning materials. The participants become your target audience. Some instructional developers prefer to use students who are in the lower portion of the population because they should make more errors and thereby give more data. Others prefer brighter than average people because they more often can tell why they made an error, or even how you might revise the lesson to make it clearer. Usually, since you probably will do several individual trials, you will be able to sample from several segments of the target audience. Pretesting them is essential if you are to have any confidence that the student learned from the instructional materials rather than from prior experience.

2.2 Conduct Individual Trials



2.2.1 Set-up for Trials

The preparation for actually conducting individual trials will be dependent upon the chosen management plan and delivery system and upon what facilities are available. Preparation will include the following:

1. Select a place to have the trials.
2. Arrange for any required lesson, or delivery system equipment.
3. Obtain manuals, pencils, paper, etc.
4. Arrange for a team of validators.
5. Have sufficient copies of all the tests printed or copied.
6. Have sufficient copies of all the forms printed or copied.
7. Set up the equipment.
8. Try the materials out where they will be used. That is, if it is a slide tape, run through it to make sure all the slides are there, in order, and right side up and that both the projector and the tape player work. If it is a videotape, play it. If it is printed material, go through it page by page.

It is valuable for the author to do some of the individual trials. If he can be objective about the student responses and opinions, he can revise based on his own contact with the student. However, some authors have too much personal involvement to make good data collectors.

2.2.2 Explain Participant's Role to Him

You need the participant to be a party to the project. He needs to know his role. Let him know he is helping to improve the lesson; that you need to use his mistakes as well as his successes. He needs to be at ease so he can tell what he thinks about the course. You do not want him to be nervous about so many tests, but you need to measure all the changes. Long series of lessons at one time can be very tiring. Be sure the student feels free to ask for a break, rest, or change of pace when he needs it.

2.2.3 Implement Data Recording Plan

You should have made decisions on how the background response and test data will be recorded. Now follow the plan. But, be flexible. If something does not work, be ready to change. For example, if the tape recorder does not work, switch to written notes. Do not lose the data, they are the basis for decisions that will affect the whole instructional system. Be accurate in recording and identifying the data.

2.2.4 Administer Entry Level Tests and Participant's Background Data Collection Instrument

Some general background information is needed about the participants: age, amount of formal schooling, length of time in the service, rank, primary DOS, and secondary DOS, if any. The form may include name or serial number or only an identifying number for trials. Figure III.22 (page 289) is an example of such a form.

You also often need some lesson-specific information like prior experience or training on the lesson objectives, and particular personal goals or orders that are incentives to use or do well on the lessons. Such information often can be included as part of the entry level test. Except for this possible addition, the entry level test is the same one that was developed in Block II.3.

If the background information collection form is to be filled in by the student, explain the purpose of the form, and have him fill it in. If you have no need for permanent records, and if you do not need the student's name or serial number to use in securing additional information about him, use code numbers, such as A1, A2, and A3, to keep each student's records together.

For students who do not write well, consider using other means of recording. If you are going to record the answers on tape, have the recorder ready and use the questions as an interview form, or if you are going to interview and write down the answers, be sure to have the right number of blank forms.

If the entry level test is a written test, tell the student what it is for and let him complete it. You may want to time this test. If so, record the time. If the entry level test is a performance test, have an expert there to judge the performance if you cannot do it. Record the student responses in the manner planned in the develop data recording system step. Score the test immediately. If the student fails it, you probably will thank him and send him back to his unit. Then, start at the beginning with a new student.

2.2.5 Administer Pretest

The same steps of explaining what the student is to do, giving him the tests, and using the data recording scheme, are used here on the pretest developed in Block II.2. Do not tutor.

Score the test immediately. If the student passes it, he is not a good individual trial subject. You cannot say that the student learned from the lesson if he already knew it. Depending on what learning objectives he has mastered, it may be best for you to get a new student.

2.2.6 Administer and Monitor Instructional Materials

For an individual trial, give the instructional materials to one student. Write down the start time. Stay with him through the whole lesson. Record each question he asks, matching it to specific places in the lesson. Figure III.27 is an example from a trial of a slide/tape

LESSON TITLE AND NUMBER (Student #5) TOTAL TIME

Frame or Unit Number	Type of Frame	Time	Student Response or Comment	Validator Comment or Explanation	
8	Ques.		Indicated Band Switch	correct	
13	Practice			Told student to use his left hand.	
20	Practice		S asked if the mHz tuning control was the mHz tuning control.	Answer "yes"	
23	Ques.	less than 30 sec	S. set the mHz tuning control to 55	correct	
28	Information				The radio on the slide is turned differently than the student's radio.

FIGURE III.27: Within-Lesson Record

lesson. Line 1 shows the student's response to the question in slide 8. Line 2 shows the reminder by the monitor to the student in slide 13. Line 3 shows a question by the student on slide 20. Line 4 shows student response and a time statement. Line 5 shows written comments on an observation made by the monitor. Do not tutor unless the student cannot understand the directions. Whenever you help, document it. At the end, write down the finish time.

2.2.7 Administer Posttest

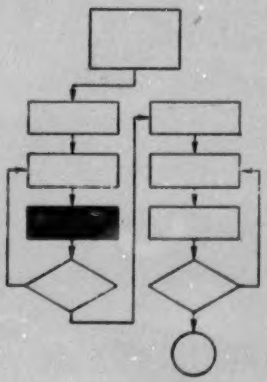
This is much like administering the pretest. Do not help the student. Record the start and stop times.

2.2.8 Administer Attitude Measures

Ask the questions that were planned and record the responses. Also, add any questions that occurred to you during the instructional materials trial. Do not bias the questions. If you point out a slide and ask the student if it would be better with two arrows instead of one, he will probably agree. If he had a problem with a slide, ask him how it could be made clearer or more helpful. Ask him questions about his problems on the posttest. More exact questions can be asked if you can score the posttest before debriefing. If this takes too much time, go ahead and talk to the student before he forgets his problems or ideas.

2.3 Determine Revision Requirements and Make Revisions

2.3.1 Consolidate and Analyze Data



Earlier you prepared a way of summarizing the data. Score the tests and fill in the form as in Figure III.28.

To illustrate, these data are from four students going through a lesson with six objectives. Each item is matched to its learning objective.

Participants A, B, and C could do all the entry level tests. C got all but one right, but D did poorly. D is probably not from the originally defined target population.

KEY: + Right
- Wrong

Learning Objective	Entry Level Test	Participant A	Participant B	Participant C	Participant D	Total
2	1a	+	+	+	-	3
2	1b	+	+	+	+	4
3	2	+	+	+	-	3
4	3	+	+	+	+	4
1 & 2	4	+	+	+	-	3
	TOTAL	5	5	4	2	

DATA SUMMARY

KEY: + Right
- Wrong

Learning Objective		Participant A	Participant B	Participant C	Participant D	Total
	Entry Level Test					
2	1a	+	+	+	-	3
2	1b	+	+	+	+	4
3	2	+	+	+	-	3
4	3	+	+	+	+	4
1 & 2	4	+	+	+	-	3
	TOTAL	5	5	4	2	
	Pretest					
1	1	-	+	+	-	2
1.	2	-	+	+	-	2
2	3	-	-	+	-	1
3	4	-	-	-	-	0
4	5	-	-	-	-	0
4	6	-	-	-	-	0
5	7	-	-	-	-	0
6	8	-	-	-	-	0
	TOTAL	0	2	3	0	
	Within Lesson Questions (Slide)					
1	3	-	+	+	-	2
1	7	+	+	+	-	3
1	12	+	+	+	-	3
2	16	-	-	-	-	0
2	17	+	+	+	+	4
3	22	+	-	-	+	2
3	23	+	-	+	-	2
3	24	+	+	+	-	3
4	30	-	-	+	-	1
5	41	+	+	+	+	4
5	42	+	+	+	+	4
6	53	+	-	+	-	2
6	56	-	-	-	-	0
	TOTAL	9	7	10	4	
	Posttest					
1	1	+	+	+	-	3
1	2	-	+	+	-	2
2	3	+	+	+	-	3
3	4	+	+	-	-	2
4	5	+	+	+	-	3
4	6	-	+	+	-	2
5	7	+	+	+	+	4
6	8	-	-	-	-	0
	TOTAL	5	7	6	1	

FIGURE III.28: Sample Test Results

The pretest data show that A and D are really "naive;" B and C can do learning objective 1. Student C can also do learning objective 2.

Lng. Obj.	Pretest	Participant A	Participant B	Participant C	Participant D	Total
1	1	-	+	+	-	2
1.	2	-	+	+	-	2
2	3	-	-	+	-	1
3	4	-	-	-	-	0
4	5	-	-	-	-	0
4	6	-	-	-	-	0
5	7	-	-	-	-	0
6	8	-	-	-	-	0
	TOTAL	0	2	3	0	

The within-course data show that learning objective 6 is a trouble area. There were only two correct responses for this learning objective on the within-lesson questions.

Lng. Obj.	Within Lesson Questions (Slide)	Participant A	Participant B	Participant C	Participant D	Total
1	3	-	+	+	-	2
1	7	+	+	+	-	3
1	12	+	+	+	-	3
2	16	-	-	-	-	0
2	17	+	+	+	+	4
3	22	+	-	-	+	2
3	23	+	-	+	-	2
3	24	+	+	+	-	3
4	30	-	-	+	-	1
5	41	+	+	+	+	4
5	42	+	+	+	+	4
6	53	+	-	+	-	2
6	56	-	-	-	-	0
	TOTAL	9	7	10	4	

The posttest data confirm problems on learning objective 6. There was no more than the expected error on any other learning objective on the posttest. You should now look at the frame-by-frame comments, at the slides and at the script.

Lng. Obj.	Posttest	Participant A	Participant B	Participant C	Participant D	Total
1	1	+	+	+	-	3
1	2	-	+	+	-	2
2	3	+	+	+	-	3
3	4	+	+	-	-	2
4	5	+	+	+	-	3
4	6	-	+	+	-	2
5	7	+	+	+	+	4
6	8	-	-	-	-	0
	TOTAL	5	7	6	1	

The following types of problems may occur in interpreting individual trial data.

You are making decisions based on very small samples; four to six individuals. The powerful statistics usually used are of dubious value in analyzing these results. If you decided that when 80 percent of the learners respond correctly you will not revise, you must remember that any chance errors will distort the decision.

	A	B	C	D	E	# Right	Total
Possible Result 1	+	+	+	-	-	3	60%
Possible Result 2	+	+	+	+	-	4	80%

If, as in Result 1 above, trainee D lost interest or made a careless mistake when he was tested, the 80% criterion that you might have considered to be the goal for the trial, was not reached and revisions are demanded. Also if, as in Result 2, D got a pass on the task because he guessed right or the monitor failed to notice his error, the criterion is reached and no revision will be made. Another possibility is that if D had not been included as a student, the total for both possible results would be 75% and both results would require revision. Clearly, a great deal of judgment must be used in drawing conclusions from such a small data base. You cannot afford to just "go by the numbers."

2.3.2 Determine Revision Requirements

At this point, the scientific part decreases and the requirement for judgment increases. Knowing what the students got wrong does not tell you how to make it right. If the student makes comments about the parts he got wrong, these comments are a good starting point. If you have only error data, go through the parts of the lesson that precede the error and see if something is missing, wrong, or misleading. If something is missing, add it. Correct errors and change misleading statements.

You may need to try small portions on students to see if the problems have been corrected.

A description of how you might determine revision requirements follows. Assume that the posttest results of the first trial look like the following summary:

LNG.	STUDENT								
OJB.	A	B	C	D	E	F	# RIGHT	% RIGHT	ACTION
1	+	+	+	+	+	+	6	100	Look at pretest and item, or is it over-taught?
2	+	-	-	-	+	+	3	50	Look at item and instruction.
3	+	-	+	-	-	-	2	33	Look at item and instruction.
4	+	-	-	-	-	-	1	17	Look at entry behavior, item and instruction.
5	-	+	+	+	+	+	5	83	No action.
6	-	-	-	-	-	-	0	0	Look at entry behavior, within course test, item and instruction.
% CORRECT	83	33	50	33	50	50	2.8		

The situation in this chart is:

1. For one learning objective, all answers were correct.
2. For one learning objective, all answers were wrong.
3. Errors are spread across all students.
4. One of the lowest scoring students passed a learning objective that the highest scoring students missed.

Places to look for the source of the problem are listed under "Action." The 100 percent on learning objective I looks like you did a perfect job. This is possible, but it is more likely that the students already knew the material, the test was too easy, or you over-taught the learning objective. The latter possibility is very difficult to identify. Interview A and ask what made him make an error in learning objective 5.

The posttest results for the second trial after revisions looked like this: (Note that old objective 1 and its instruction were dropped. The supervisor decided that it was too easy. An additional learning objective, 6a, was added--previously overlooked entry behavior needed for learning objective 6.)

LNG. OBJ.	STUDENT						# RIGHT	% RIGHT	ACTION
	A	B	C	D	E	F			
2	+	-	-	+	-	-	2	33	Look at relationship of Lng. Obj. 2 and dropped Lng. Obj. 1
3	+	-	+	+	+	+	5	83	No action.
4	+	+	+	-	-	-	3	50	Analyze and revise/correct.
5	+	+	+	+	+	+	6	100	No action.
6a	+	-	-	+	+	+	4	67	Analyze and revise/correct.
6	+	-	-	+	+	+	4	67	Analyze and revise/correct.
% CORRECT	100	33	50	83	67	67	[illegible]		

The situation in this chart is:

1. For one learning objective, all answers were correct.
2. For one student, all answers were correct.
3. The results on one learning objective were poorer than on the first trial.
4. All other results were an improvement.

The poorer performance on learning objective 2 may be a result of dropping the instructional material related to learning objective 1. Interview D, E, and F to determine what made them make errors in learning objective 4. Interview B and C for learning objectives 6a and 6.

The posttest results for the third trial after revisions looked like this: (Note that old learning objective 1 and some of its instruction were replaced.)

LNG.	STUDENT								
OBJ.	A	B	C	D	E	F	# RIGHT	% RIGHT	ACTION
1	+	+	+	+	+	+	6	100	No action.
2	+	+	+	-	+	+	5	83	No action.
3	+	+	-	+	+	+	5	83	No action.
4	-	+	+	+	+	-	4	67	Analyze and revise.
5	+	+	+	+	+	+	6	100	No action.
6a	+	+	+	+	+	-	5	83	No action.
6	+	+	-	+	+	+	5	83	No action.
% CORRECT	86	100	72	86	100	72	5.1		

The situation in the above chart:

1. Errors are distributed across students and across learning objectives.
2. Only learning objective 4 requires further revision.

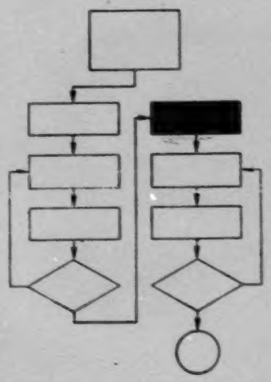
The documentation of the small group trial should include all of the results, events, reactions, and monitor's comments. An example of a report is presented in Appendix A.

2.3.3 Repeat Cycle or Go to Group Trials

There is no magic number of individual trials. They require a heavy manpower input but usually contribute a great deal of valuable information. From three to five seems to be the usual number. Some people make revisions after each student. This gives very heavy weight to each student and may cause you to make more revisions than are needed or to keep revising on the smallest possible data base.

If the results of the individual trials were good; that is, students came close to the goals, and you received as much information as you felt was needed as to how well individuals learned the materials, go ahead to group trials. If the results were poor and you made extensive revisions, repeat the individual trials until the lesson does what it is supposed to do. Then go ahead to group trials.

2.4 Develop Plan for Group Trials



Group trials can be of any size. From five to ten is considered a small group; if more than 25, a large group. In this section group trials will first be treated generally, then any special differences between small and large groups will be covered.

You may conduct several small group trials or none. Several small groups may be a substitute for a large group and you may do one or several large group trials. It all depends on what you are working toward, how much time and resources can be used, and the problems encountered.

Much of what was prepared for individual trials can be used or adapted for the group trials. Those measures that were already covered in the individual trial part are only touched in this section.

2.4.1 Set Standards and List Constraints

You may have some preset goals that you set and others that were externally imposed. In the first case you can revise them to fit reality, in the latter case you may have little control. However, keep careful records of the goals, procedures and needs, for whomever controls the standards.

Standards are usually stated in terms of what proportion or percentage of the students reached criterion on each learning objective. An often used standard is 80 percent (meaning 80 percent of the students reached the predetermined criterion). Set the standards in terms of the alternative resources available for additional instruction. Be a little flexible. There is nothing sacred about the set criterion. There is much error in measurement. There are sources of error both in the measuring instrument and in the learner's performance. On the average, a totally naive learner would get 25 percent correct by chance on a four-choice multiple choice pretest. But on any one test he might score 50 percent or 0 percent. The same guessing factor exists in a posttest. Even in a performance test, the learner may make a chance error. The test monitor can make mistakes scoring the performance. When you say you want 80 percent, you are talking about the population. When you take a sample it is unlikely that it is completely representative of the population; therefore, different samples will yield different scores after the same instruction.

If the standards are minimum 85 percent, but you have a performance test and 25 students, you have already changed the standard. Percents of students will be in multiples of 4, and 88 will be the first possible above 85, and you have forced yourself into an 88 percent minimum. Each trial after revision usually raises scores, numbers to reach criterion, or both. But, after large initial gains, each increase gets harder and more expensive to reach. It is preferable to set a range of standards such as 80, give or take five points.

However, some learning objectives are totally dependent on others. In cases where the terminal learning objective cannot be performed unless any one or more of its learning objectives are mastered, those learning objectives will have to have a 100 percent criterion.

The constraints are primarily time and resources. They can involve equipment. Do not plan a large group trial for operation of heavy equipment when you can only arrange for one piece of the equipment at a time. In such cases, you will have to try the materials on students serially. Trials involve manpower. If the need is for performance testing, you will be limited by the number of monitors who are available or can be trained. Constraints can be environmental. If certain weather conditions, space, or geographic locations, are required, you need to plan within what you can get. There also may be deadlines for completions to consider. These constraints interact to present very restrictive sets of conditions. Plan to work within them.

2.4.2 Select or Develop Data Recording System

After you have decided what data is needed, prepare a way to record it while it is being collected and a way to display it so it can be analyzed. Since you are likely to be measuring more people than in the individual trials, consider machine scorable answer sheets if they can do the job. An example of a hand recorded data summary is shown in Figure III.29.

Posttest Data
Group Validation Armored Vehicle Recognition
Lessons 1 and 2—11 Jan 74

Item	Type Item	Correct Response	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Vehicles by country, model (type of Soviet vehicle)	No. Right	% Right
1	RR	R	✓	✓	✓	W	✓	✓	W	W	✓	W	W	✓	✓	W	W	Soviet, T34, medium	8	53
2			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	US, M60A2	15	100
3			✓	✓	✓	W		✓	W	W	✓	✓	✓	✓	✓	W	✓	Soviet, ASU 85, assault gun	11	73
4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	W	✓	✓	✓	US, M60A1	14	93
5			W	✓	✓	W	✓	✓	✓	✓	✓	✓	W	✓	✓	✓	✓	Soviet, T62, medium	12	80
6			✓	✓	✓	✓	✓	✓		✓	W	W	✓	W	✓	W	W	French, AMX30	10	66
7			✓	✓	✓	✓	✓	✓	W	✓	✓	✓	W	✓	W	W	✓	British, Chieftain	11	73
8			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	US, M551	15	100
9			W	✓	W	W	✓	✓	✓	✓	W	W	W	W	W	W	W	British, Centurion	5	33
10			✓	✓	✓	W	✓	✓	✓	✓	✓	✓		✓				Soviet, PT76, amphibious	14	93
11			✓	✓	✓	✓	✓	✓	W	✓	✓	W	✓	✓	✓		✓	Japanese, Type 61	13	86
12			W	✓	✓	W					✓	✓	✓			✓		Soviet, ASU57, assault gun	13	86
13			W		W	W	✓	✓	W	W	W	✓	W	W	W	W	✓	German, Leopard	5	33
14			W		✓	✓	✓	✓	W		✓	✓	✓	✓	W	W		German, Jagdpanzer	11	73
15			✓		✓	W	✓	✓	✓	✓	✓	W	✓	✓		✓	W	French, AMX13	12	80
16			✓		✓	✓		✓		✓	✓		W	✓	✓			US, M60	14	93
17					✓	W	✓	✓	W	✓	✓	✓		✓		✓	W	Soviet, T55, medium	12	8[illegible]
18	RR	R	W	✓	✓	W	✓	✓	W	W	W	✓	✓	✓	✓	✓	✓	Soviet, T10, heavy	10	66
	No.	Right	12	18	16	8	18	18	10	14	14	13	12	14	14	11	13	Student answer sheets 1-15 for posttest are attached at red tab.		
	%	Right	66	100	88	44	100	100	55	77	77	72	66	77	77	61	72			

FIGURE III.29: Posttest Data

Using large numbers of students may require minimizing the amount of data collected. Collect the data in a form that is usable with the minimum amount of conversion. If you are going to use total scores, only record them rather than element or item scores. But do not throw away or fail to collect data you will need. It is hard to get students back after the trial.

2.4.3 Revise Attitude Measures

If you are going to make any decisions based on attitudes, look at the attitude measures from the individual trials. Will they be sufficient? Do they require revision? Must new ones be prepared?

2.4.4. Select or Develop Data Analysis Plan

How are you going to use the numbers to make decisions? Individual comments, masses of numbers, etc., become more meaningful when they are organized. (See Figure III.29 .) The R's indicate "right" and the W's indicate "wrong." The W's are more numerous than the R's, but it is easier to think about the column and row summaries and the percentages. If you have many test elements and/or students, consider using a combination of machine scorable answer sheets and computer data analysis.

Whether you or the computer analyze the data, the technique for summarizing it must be selected. Do you want averages? You can compute means and standard deviations. Do you have some criteria to reach? Do the criteria need to be stated by objective or on the sum of the objectives?

2.4.5 Select and Develop Procedures for Group Trial

The procedures will be determined by the lesson itself, the number of participants, and the data needed. In a small group trial, you will have an opportunity to get individual feedback much like that received in an individual trial. In a large group trial the students will be treated more like those in a course situation. As much as possible, avoid interfering with the lesson. Anything you do, even the measuring instruments, influences the outcome.

2.4.6 Determine Number of Participants Needed

When there are members of the target audience readily available and there are no resource constraints, use an arbitrary number such as 20-30 for the large group trial. However, there are often some limits to members of the target audience or the time and resources available to conduct trials. There is a procedure for selecting a minimum sample that permits you to make statistically valid decisions. Your minimum sample will vary depending on how sure you need to be of your decision. This procedure is particularly useful when the resources involved in validating are scarce and testing is sequential, one or a few students at a time. You rate the learning objective in terms of its consequences of inadequate performance, performance delay tolerance, availability of trained job holders in the field, learning difficulty, and amount of practice the trainee will have. Based on the score on these criteria, a chart is used for selecting minimum and maximum sample sizes.

First, fill out the learning objective rating sheet (Figure III.30) The range of ratings is from 0 to 34.

	Learning Objective Number					
	1	2	3	4	5	6
1. What are the consequences of inadequate performance? a. Very serious (10 points) b. Serious (5 points) c. Average (1 point) d. Negligible (0 points)						
2. Does the job holder have time to consult references or seek other help when required to perform the task? Is immediate action required as, for example, with first aid? a. Immediate action required (10 points) b. Some degree of urgency is required but job holders frequently have time to seek assistance. (5 points) c. Job holders almost always have time to seek assistance. (0 points)						
3. What is the availability of adequately trained job holders in the field to assist in training? a. Few available (5 points) b. Usually available (2 points) c. Almost always available (0 points)						
4. How difficult is the learning objective to learn? a. Very difficult (5 points) b. Average difficulty (2 points) c. Easy to learn (0 points)						

FIGURE III.30: Learning Objective Rating Sheet

	Learning Objective Number					
	1	2	3	4	5	6
5. Will the learning objective be practiced again in subsequent lessons, or is the lesson the only choice to learn the task? a. This lesson is the only instruction. (4 points) b. The learning objective is practiced only once or twice in subsequent lessons. (2 points) c. The learning objective will be practiced many times in remaining lessons. (0 points)						
TOTAL						

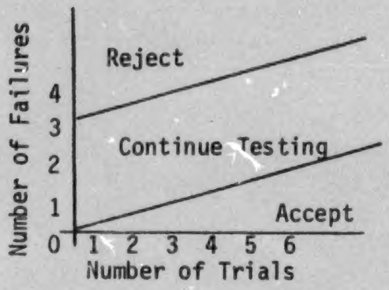
FIGURE III.30: Learning Objective Rating Sheet (Continued)

If the rating is:

29 - 34, use Chart 1 (Figure III.31),
21 - 28, use Chart 2 (Figure III.32),
13 - 20, use Chart 3 (Figure III.33),
7 - 12, use Chart 4 (Figure III.34), or
0 - 6, use Chart 5 (Figure III.35).

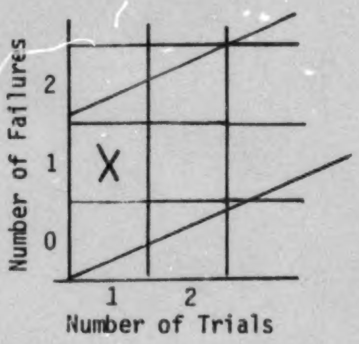
Suppose the rating for the learning objective is 19, therefore, Chart 3 (Figure III.33) is used. The minimum number of students for an accept decision is 7 and for a reject decision is 4. The maximum is 46.

The area on the graph between the diagonal lines is the "continue testing area." Above the lines is the "reject instructional materials" or no-go area. The area below the lines is the "accept" or go area.



To mark the charts, place an X on the graph for each trial. The numbers on the vertical axis are the number of students who failed the objective. The numbers on the horizontal axis are the number of trials.

If the first trial is a failure, place an X over the 1 column of the number of trials and beside the 1 column of the failures.



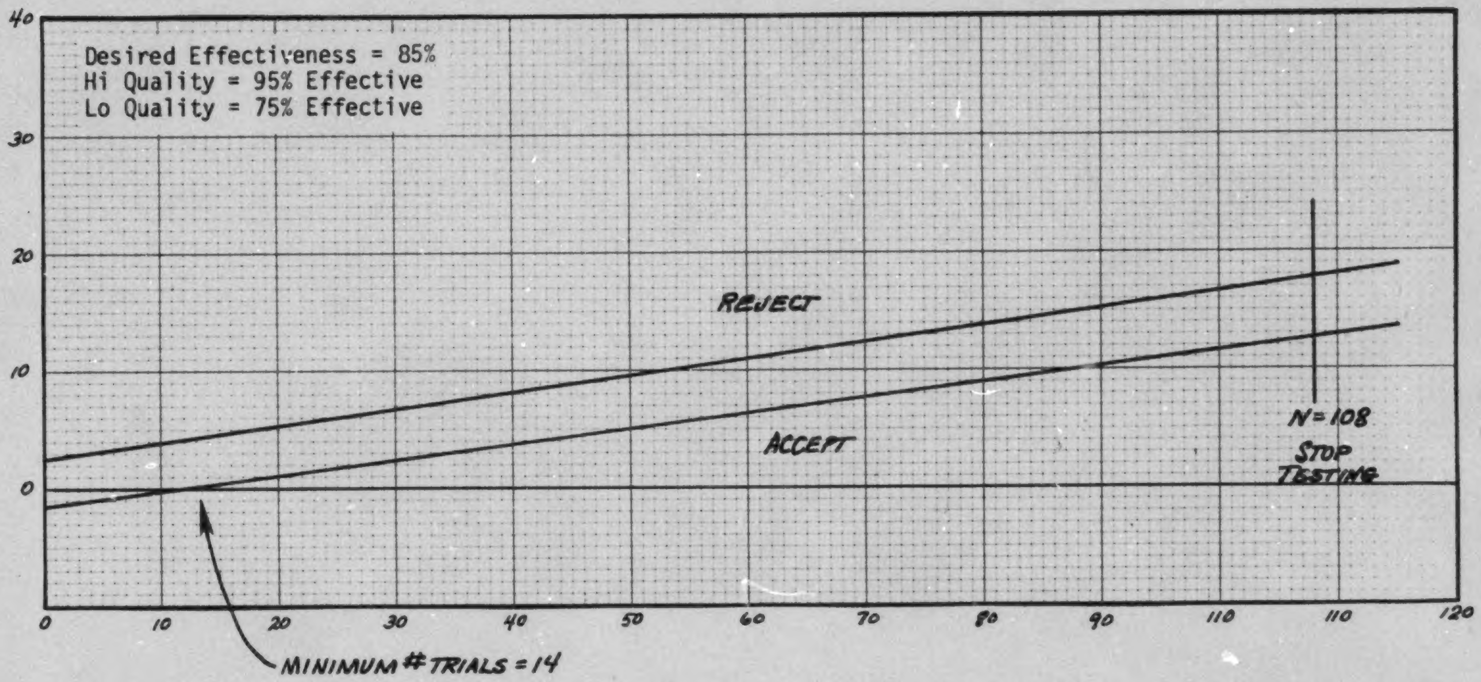


FIGURE III.31: Chart 1

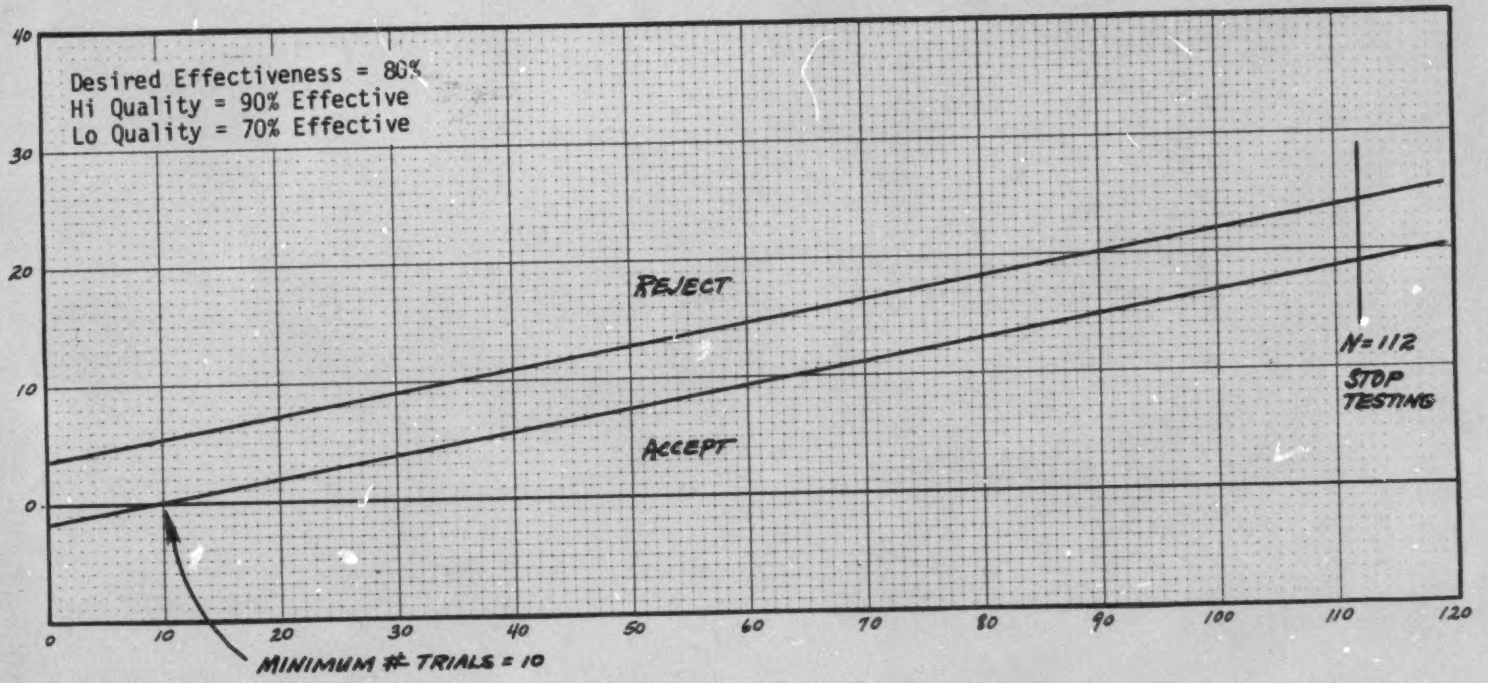


FIGURE III.32: Chart 2

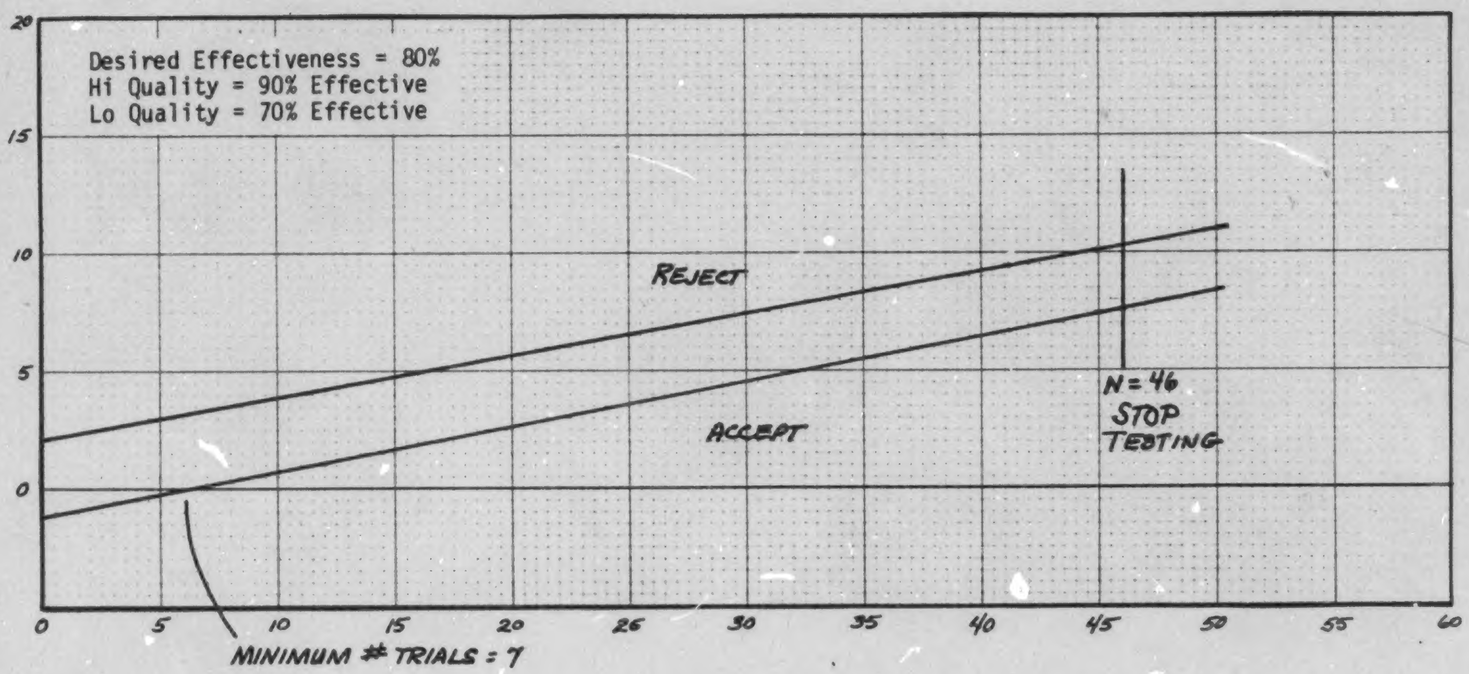


FIGURE III.33: Chart 3

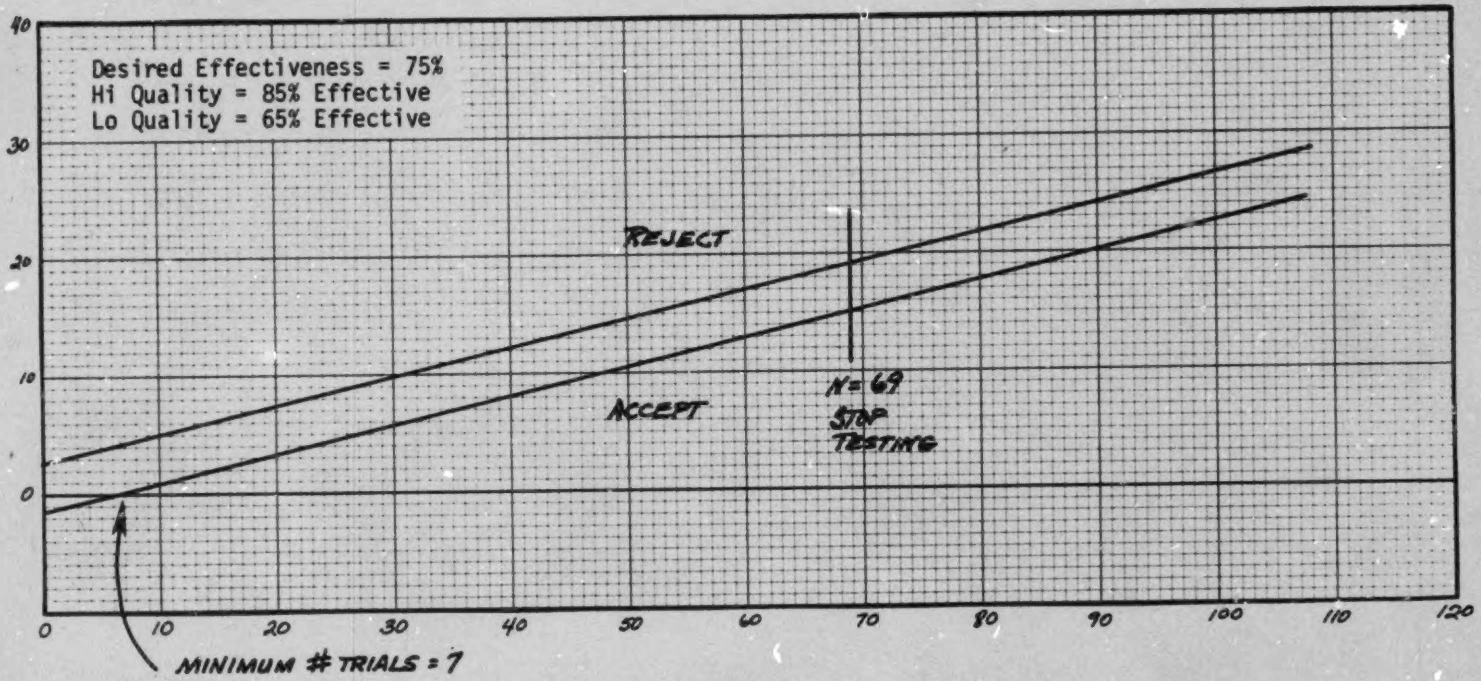


FIGURE III.34: Chart 4

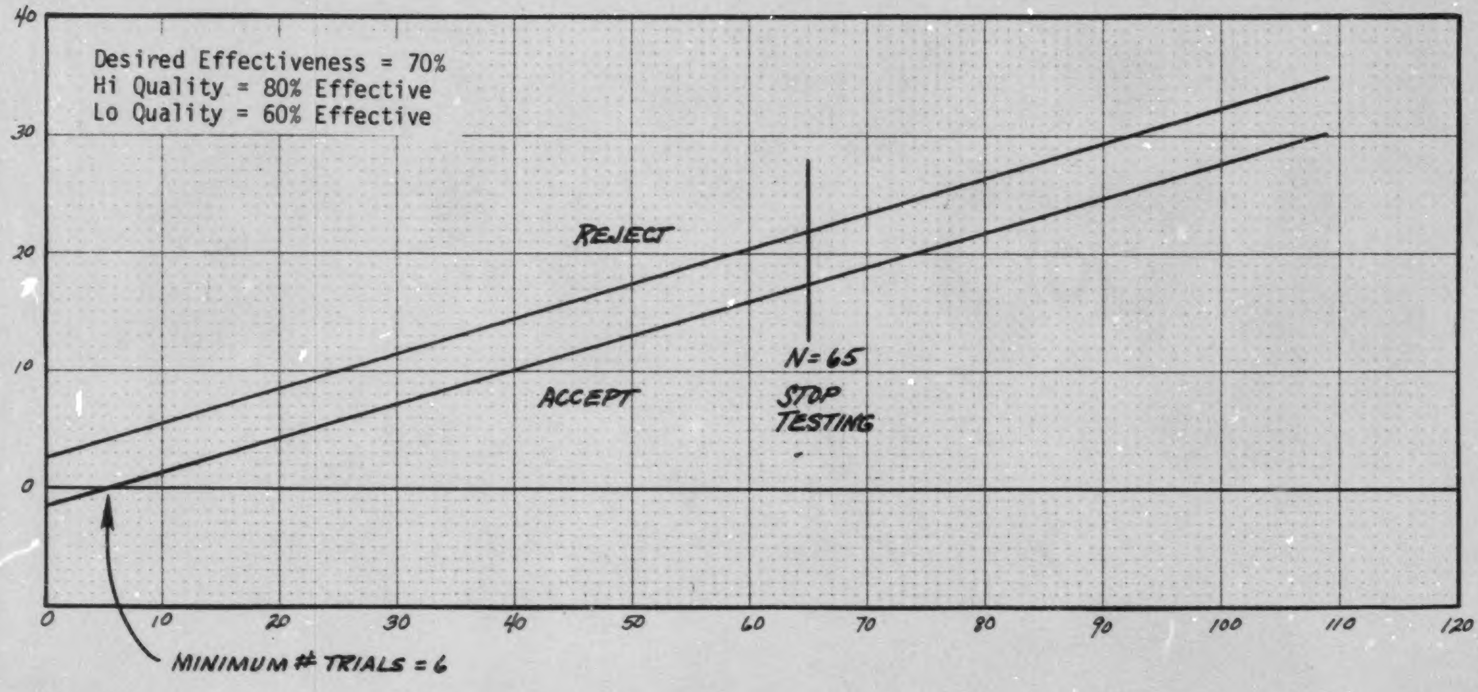
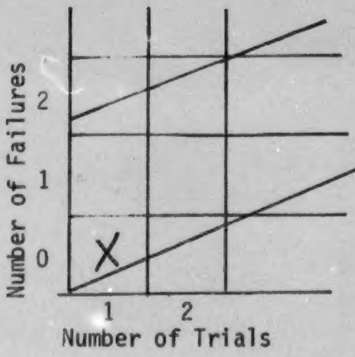


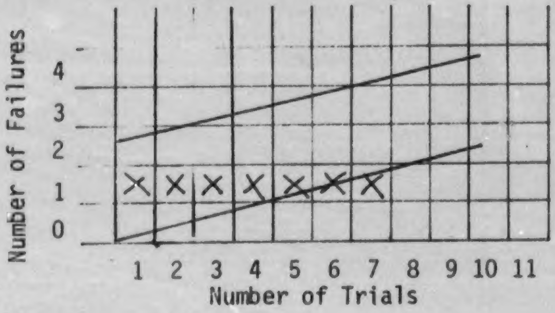
FIGURE III.35: Chart 5

If the first trial is a go, place an X over the 1 column of the number of trials and beside the 0 column of the failures.

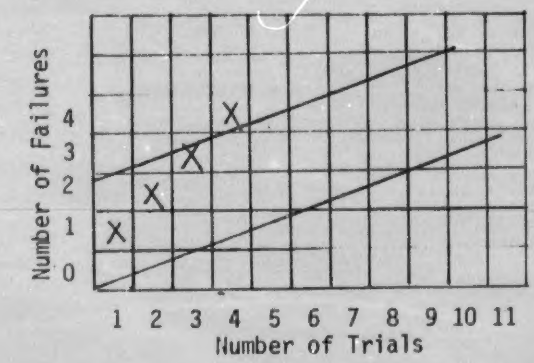


Continue to place the X's horizontally for each go and diagonally up for each no-go.

If all the trials are go's, the chart would look like this and the 7th trial is in the accept area and testing can stop.



If all the trials are no-go's, the chart would look like this and the 4th trial is in the reject area and testing can stop.

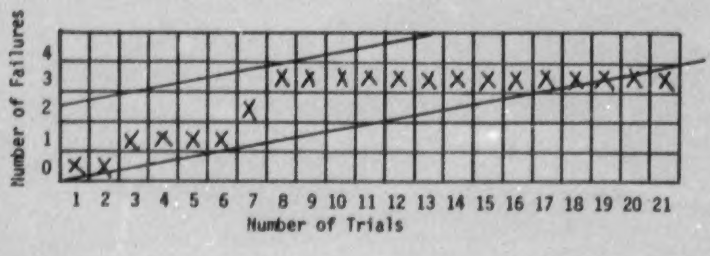


Test Data

Chart

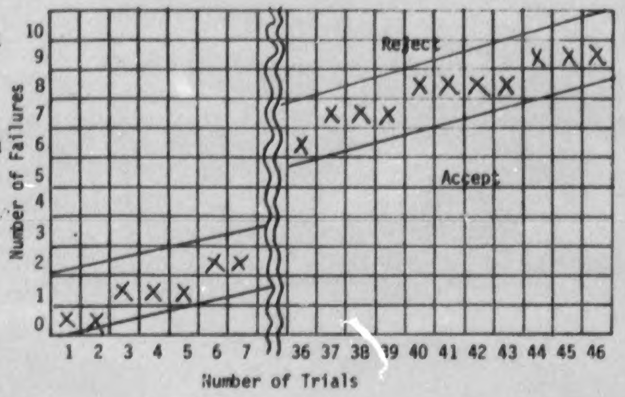
Student:

A	go
B	go
C	no-go
D	go
E	go
F	go
G	no-go
H	no-go
I	go
J	go
K	go
L	go
M	go
N	go
O	go
P	go
Q	go
R	go
S	go
T	go
U	go



The more usual result would be a mixture of go's and no-go's. When there are 3 no-go's it takes 21 trials to reach the accept area.

Sometimes the maximum number of trials will be reached without a decision. In that case, count the squares up to the reject area and down to the accept area. Whichever is closer should be chosen.



2.4.7 Select Participants

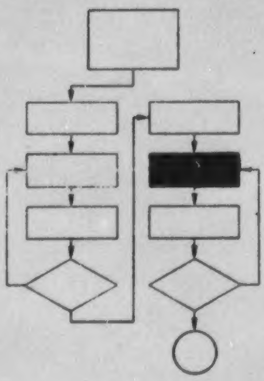
The participants will determine the lesson outcomes and therefore the revisions. Be sure they come from the intended population.

2.4.8 Train the Validators

If you are going to have anyone else involved in the formative evaluation process, they need to know the plans. As with the procedures used, the participants, and the measuring instruments, the validators will influence the outcome. If the validators help or tutor the participants and it is not an intended part of the lesson, you will have a non-replicable and maybe undocumented influence on the outcome.

2.5 Conduct Group Trial

2.5.1 Conduct Trial and Collect Data



This and the next several steps are much the same as for the individual trials. Ask for the students' cooperation. Try to keep them from being anxious. Administer entry level tests and participant data collection instruments. Administer pretest. Administer and monitor instructional materials. Administer posttest. Collect and record all planned and unplanned information. Debrief participants.

2.5.2 Validation of Platform Instruction

One of the more commonly used approaches to instruction is the lecture or classroom presentation. Each service has its own specific requirements for the development of platform instruction, and Block III.4 described procedures for the development of new classroom presentations.

In order to be consistent with the ISD approach, lectures, platform instruction, and other forms of classroom presentations must be subjected to the validation process if they are to be an important part of training.

There are two kinds of classroom presentations which must be considered. The first is the existing presentation which has already been prepared, rehearsed and, perhaps, used for several classes. For this type of presentation the procedure is slightly different than for the development of new platform instruction.

The first step with existing platform instruction is to be sure the topics to be covered in the presentation are clearly and directly related to the objectives of the course. There is a great source of potential error here. Because of student interest, past questions, and past experience of the instructor, it is quite possible for unrelated and irrelevant material to gradually creep into the presentation. Therefore, the development of a clear relationship between the objectives and the topics or presentations needs to be made explicit.

The second consideration in the validation of existing lectures is an examination of the objectives and handouts made to the students. The handouts must clearly indicate the kind of performance expected from the students and these performances must clearly match the objectives. Once it has been determined that the topics and presentations are directly related to the objectives, the test items for that particular presentation must be related to these objectives. The test items should be developed according to the procedures outlined in Block II.2. They should be limited to a single presentation.

Each presentation should be evaluated separately rather than making several presentations and evaluating them at the end of a week or longer period. A relatively detailed test from Block II.2 is required to evaluate student performance within a given presentation.

Another important consideration is deciding whether the test should be administered immediately following the presentation or presented after the students have studied any materials specified in the lecture. It is quite common to make assignments to go along with a presentation and it is the aggregate assignment and presentation that is to be evaluated. However, for validation purposes, the students should be tested immediately following the presentation on those items specific to the presentation, and tested again after they have had time to study, on those items which are based on the outside activities.

One purpose of the careful attention to learning objectives and test items is to segregate the learning due to the presentation and that due to the outside activity. It may be that if errors are consistently made on some items, there is a difficulty with the outside materials, or it may be that something in the presentation is confusing to the students. Detailed testing will ordinarily reveal the source of the problem and the required revisions can be made.

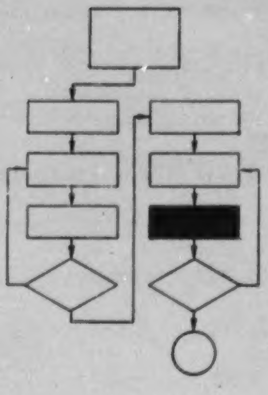
When the test results are analyzed for existing platform instruction, it may become clear that the presentation did not provide sufficient time or examples or clarity on one or more topics. By changing the amount of time devoted to a given topic or by changing the kinds of rules or examples or non-examples presented, the instructor can often make dramatic improvements in the amount the students learn. The same rules for analysis of the learning objectives described elsewhere in this block should apply to the classroom presentation as well.

For new presentations, the material can be organized according to the intended method of testing. That is, topics within lectures can be isolated and clearly related to the learning objectives and the test items for those objectives. The presentations should be tried out, wherever possible, on members of the target population before they are actually used in a regular classroom setting. In those instances where it is not possible to try out the materials ahead of time, a careful record, usually an audio tape plus a copy of any chalkboard displays or other training aids used with the lecture, should be kept of each presentation. This will permit thorough review of presentations and, through time, the original presentations can be revised to eliminate any problems.

2.5.3 Analyze and Consolidate Data

This is more complicated than after the individual trials, but if the recording and analysis plans were good, they should provide the required data base. If they do not, revise both plans based on the data obtained.

2.6 Determine Revision Requirements and Make Revisions



Based on analysis of trial data, make necessary revisions to the program. Remember that more than just the instructional materials may have to be revised. You may have to make changes to pretests, management plan, delivery system, or posttest, etc.

A subject matter expert (SME) will be needed as the technical advisor on revisions. If at all possible, use an SME who is thoroughly familiar with the current field use of the task being taught rather than one who has taught the task in a formal school environment. He will be more conscious of job requirements and be less tied to the way things have always been done in the school.

As was true following the individual trials , there are no firm rules here for making revision decisions. General guidelines were presented earlier in the block. Following is another discussion that provides guidelines more specific to making revision decisions following group trials.

Suppose you have just completed a formative evaluation on 30 students. The data looks like this:

Learning Objective	Item	Errors Entry Behavior	Errors Pretest	Errors W/I Course	Errors Posttest
1	1	0	0	0	0
	2	5	19	8	4
	3	25	30	20	20
2	4	3	22	21	20
3	5	2	7	7	6
	6	2	10	6	18
4	7	1	6	4	3
	8	4	24	14	2
5	9	3	15	14	5
	10	7	22	3	6

What does the data mean?

Lng. Obj.	Item	What Does It Mean?	What Can You Do?
1	1	a. Questions have give-away answers. b. Everyone knows it already.	a. Rewrite the question. b. Drop the item and the matching learning material.
	2	2/3 failed it on the pretest, 1/3 W/I course, and only 4 failed on the posttest.	Look at the 4 error responses and see if they all made the same error--if so, add only enough information to prevent the error. If they made different errors, probably do nothing.
	3	a. 80% lacked entry behavior.	a. Reanalyze entry behaviors; add the necessary prerequisites to the lesson.

Lng. Obj.	Item	What Does It Mean?	What Can You Do?
	3	b. All failed pretest, 2/3 failed W/I course, and no improvement from W/I to posttest.	b. The errors on the W/I course item should be analyzed and changes made in the learning material. If the additional instruction does not help, try adding better remedial feedback after W/I course items.
2	4	2/3 failed all three tests.	You haven't changed behavior. Go back to the learning objective, look at the learning objective, learning material, and test item for match. Reanalyze the task for some other entry level behaviors or additional learning objectives.
3	5	Only 1/5 failed all three times.	You have 80% on the pretest, but you really didn't improve scores enough to think they have learned anything. Are the errors made by the same people on all three tests? If so, check as for item 4. If not, perhaps the item and the learning material should be dropped.
	6	1/3 failed pretest, 1/5 on W/I course, but 1/2 on posttest.	Look at feedback for item at W/I course point and subsequent to W/I course item to find something that has mislead the students. Or, you may need a review before the end of this part of the learning objective.

Lng. Obj.	Item	What Does It Mean?	What Can You Do?
4	7	Less than or equal to 1/5 on all three.	You have improved scores but you are probably wasting time to even have the learning objective. Check to see if you can omit the item and the material, or decrease the material to a reminder and possibly omit the item if other learning objectives are dependent on this learning objective.
	8	2/3 failed pretest, 1/2 failed W/I course, almost none failed posttest.	The final result was excellent, but some of what was done after the W/I course test should be done before it, unless it was the error correction that they learned from.
5	9	1/2 failed pretest, 1/2 failed W/I, 1/6 failed posttest.	The learning materials prior to the W/I course test were not effective. They could be dropped if the errors are made by the same people on W/I course test and posttest. If not, incorporate what came after W/I test before it.
	10	2/3 failed pretest, 1/10 failed W/I, 1/5 failed posttest.	Looks exactly as it should. Perhaps a minimum of review before the posttest based on the posttest errors would keep down the posttest errors.

It may be necessary to repeat the revision cycle. If the students did not reach criterion, you need to repeat the revision cycle.

When the revisions are completed, and you have again tried them out and made sure they work, it is time to try the instructional materials with real world instructors and the system management plan.

3.0 OUTPUTS

The outputs of this block should consist of a summary statement of pertinent factors in each validation trial (see example). As a minimum, this statement should contain:

1. Participant background information
2. Instructor qualifications
3. Data and place of trial
4. Learning objectives
5. Outline of data recording plan
6. Entry tests used
7. Pretests used
8. Within course tests used
9. Posttests used
10. Plan for presenting learning materials
11. Any deviations from instructional plan or data recording plan
12. All test data in consolidated or summarized form

13. Recommendations for revisions after each trial
14. Rationale for revision recommendations
15. Summary of revisions actually made
16. Rationale for any differences between revision recommendations and actual revisions

EXAMPLE

Sample documentation for a single validation trial on materials designed to teach maintenance of the OH-58 helicopter's power train system:

1. Participant Background: 26 students who were to enroll in the OH-58 Helicopter resident school the following week.
2. Instructor Qualifications: The instructor taught OH-58 helicopter repair at the resident school for 3 years and was recommended by the school.
3. Data and Place: Fort Dix, New Jersey. August 1, 1975.
4. Learning Objectives:

   a. In a Maintenance work area using an OH-58 helicopter, Technical Manual 55-1520-228-20, general mechanics tool kit, maintenance platform, and DA Form 2408-13, the student will troubleshoot the power train system in accordance with Technical Manual 55-1520-228-20.

   b. In a maintenance work area using an OH-58 helicopter, Technical Manual 55-1520-228-20, general mechanics tool kit, maintenance platform, and DA Form 2408-13, the student will perform a maintenance operational check in accordance with Technical Manual 55-1520-228-20.

5. Data Recording Plan: Data on each student will include:

   a. Background information
   b. Attitude questionnaire results
   c. Entry level test results
   d. Pretest results
   e. Within-course test results
   f. Posttest results
   g. Validator's comments to student
   h. Student questions and remarks
   i. Interview results
   j. Time spent on lessons and sub-lessons

6. Entry Test Used:

   a. Select the appropriate tool for each fastener.
   b. Name each tool in the general mechanics tool kit.
   c. Explain the use of each tool in the general mechanics tool kit.

7. Pretest Used:

   a. Remove tail rotor hub
   b. Remove tail rotor gear box.
   c. Remove tail rotor drive shaft.

8. Within-course test used: (Same items as pretest, but with reduced standard of performance.)

9. Posttest Used: Same items as pretest.

10. Presentation of Instructional Materials: The instructor demonstrated all the maintenance functions for the power train system while explaining his activities. The instructional materials were the script and activity sequence outline which he repeated precisely.

11. Deviations from Plan: The instructor answered several spontaneous student questions. The questions and responses were recorded on videotape.

12. Consolidated Test Data:

    a. Entry level test - $\overline{X} = 7.9$
    b. Pretest results - $\overline{X} = 3.6$
    c. Posttest results - $\overline{X} = 18.7$

13. Recommendations for Revision:

    a. Delete introductory "general remarks."
    b. Provide instructor with replicate tool kit.
    c. Delete item #7 from pre-test, within-course test, and posttest.
    d. Evaluate item #12 and related instruction.
    e. Evaluate student request for individualization of "remove main rotor swashplate."

14. Rationale for Revisions:

    a. Remarks do not relate to specific objective.
    b. Instructor's tool kit was missing a spanner wrench.
    c. Item too easy. Everyone passed it each time.
    d. Poor performance.

15. Summary of Revisions Actually Made:

    a. Introductory "general remarks" deleted.
    b. Instructor's equipment checklist developed.
    c. Item #7 deleted.

16. Rationale for Differences between Recommendations and Actual Revisions:

    a. Poor performance on item #12 may indicate either a poor item or poor instruction, but this data is inconclusive. The instruction relating to the item as well as the item itself will be retained as is and used again in the next tryout.

    b. Though most students requested individualization of the instruction, "remove main rotor swashplate," this will not be done. Student test performance was not adequate and it is not cost-effective to individualize one small segment of a large group presentation.

17. Additional Comments: Though the students had been selected to attend OH-58 helicopter school, they were not an ideal sample. Their background data indicated a greater interest in mechanics than most incoming OH-58 helicopter school students. Their scores may be unusually high as a result.

APPENDIX A

EXAMPLE OF SMALL GROUP TRIAL REPORT

APPENDIX A

EXAMPLE OF SMALL GROUP TRIAL REPORT

I. Administration of Test

- A. Administrative
  1. Background data sheet numbered 1 through 4
  2. Tablets of paper
  3. Pencils
  4. Cassette recorder with one tape
  5. Stop watch
- B. Hardware
  1. Two study carrels equipped with Norelco cassette tape players
  2. Two M203's
  3. Two cleaning rods
  4. Two cans of oil and cleaning patches
- C. Courseware
  1. Pre-post test
  2. Four notebooks containing the 180 story board frames of the program
  3. Four tapes of the M203 script
- D. Breakdown of how one-on-one formative evaluation was conducted
  1. Briefing
     - a. Explained briefly what TEC is
     - b. Explained soldier's role as tester of materials
  2. Had the four test soldiers fill out background data forms

3. Assigned control numbers
4. Started first soldier on pretest
5. Gave soldier notebook 1 of story board, cassette tape and M203
6. Subject expert monitored soldier
7. Administered posttest
8. Debriefed soldiers

E. Special problems

1. Three subjects had hangovers. One was actively ill.
2. Photographers and observers made soldiers very nervous.
3. Tapes were not timed to soldiers' pace.
4. M203's arrived late and were very oily.
5. There were no dummy 40mm grenades.

II. Test Results

A. Background information

0.	Duty Assignment	Armor	Tanker	Gunner	Tank Crewman
1.	Rank	E-3(Pfc)	E-3(Pfc)	E-3(Pfc)	E-5(Sgt)
2.	Date entered service	11/29/71	11/29/71	9/29/71	7/11/69
3.	Time in grade	14 mos.	--	14 mos.	36 mos.
4.	Date completed BCT	2/18/72	2/29/72	12/3/71	9/18/69
5.	Date completed AIT	5/ /72	--	3/23/71	10/20/69
6.	Education level	11	10	10	GED
7.	Primary MOS	--	11E10	11E10	11E40
8.	Secondary MOS	--	--	--	11B40

		Armor	Tanker	Gunner	Tank Crewman
9.	Age	22	20	19	21
10.	Prior training with M203	none	none	none	none
	Number	1	2	3	4

B. Pre-post Test (possible 50 points)

Soldier	Pretest	Posttest	%	Change	Actual gain / Possible gain
1	2	35	70	33	$\frac{33}{48} = .69$
2	0	33	66	33	$\frac{33}{50} = .66$
3	6	42	84	36	$\frac{36}{44} = .82$
4	10	37	74	27	$\frac{27}{40} = .67$
x	4.2	38	76		

C. Time in Minutes

Soldier	Pretest	Within Program	Posttest	AM/PM
1	11	97	24	AM
2	20	92	16	PM
3	35	127	30	AM
4	25	70	25	PM

D. Reaction to Program

1. The overall reaction was favorable. The soldiers did not have prior experience with the M203 and liked handling it.
2. The debriefing interview indicated a positive attitude. They all said that the audio was clear, the pictures mostly helpful, they were not bored, and they were never lost. However, one said there were too few questions, one said too many, and one said just the right number.
3. No really useful remarks were made about improving the course. One suggested using more questions.

E. Observers' Comments

The program had been edited several times by subject experts. The same subject experts were also observers.

Frame	Comment
31	picture upside down
32	need more time
39	soldier missed barrel extension
40	include picture of weapon
40A	need more time and better explanation
46	missed guide, stop, latch, track
48	more time, better differentiation of sights
53-55	more time - error of screw
57	more time - error of screw
58-65	confusing because weapon in picture is disassembled, needed review
72-73	lost, couldn't clear M203 or M16A1

Frame	Comment
76-89	change one minute method to method 1
90-95	difficulty getting handguard off
102	visual not clear
113	directions confusing
114	talked through method 2
115	didn't know conditions
117	picture and audio don't represent combat
130-132	confusion of LSA and LAW
136	confusion - asking about temperature range
148	review care under different weather

General Comments

1. Make differences between two procedures more pronounced.
2. Have student demonstrate clearing rather than write about it.
3. Clarify objectives. Make sure he finds parts on M203.
4. Need clarification on why M203 is disassembled.
5. Need clarification on why only 2 parts are taken off in one minute method.

F. All errors and comments will be considered in the rewriting.

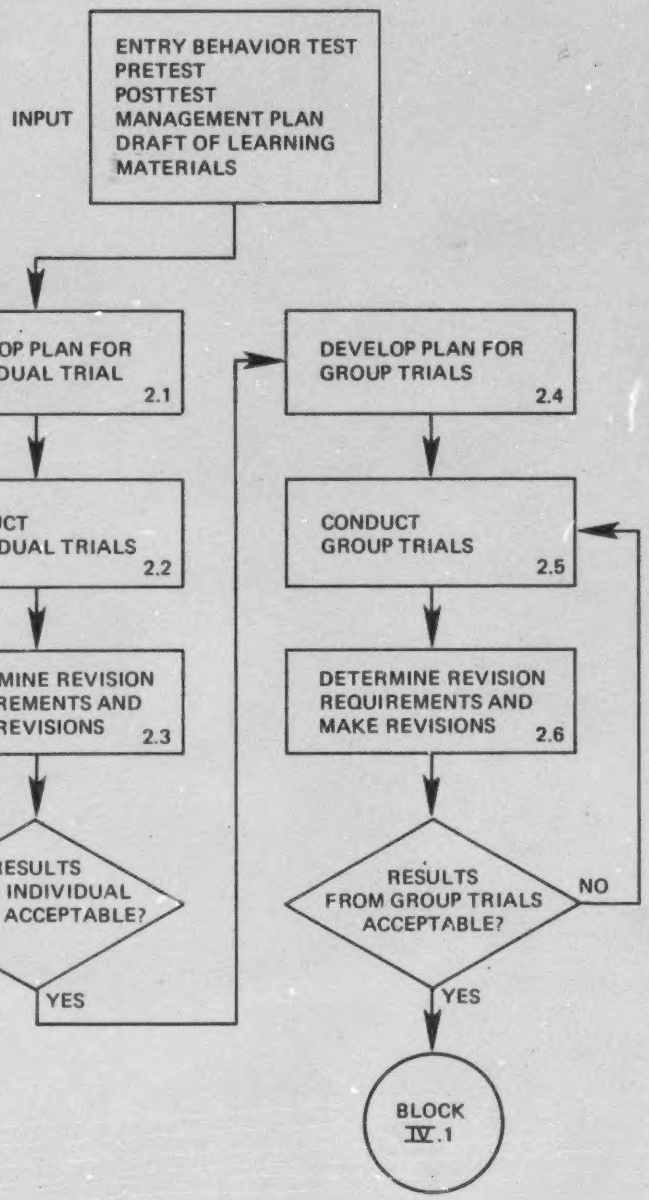

INPUT
ENTRY BEHAVIOR TEST
PRETEST
POSTTEST
MANAGEMENT PLAN
DRAFT OF LEARNING MATERIALS
DEVELOP PLAN FOR INDIVIDUAL TRIAL 2.1
CONDUCT INDIVIDUAL TRIALS 2.2
DETERMINE REVISION REQUIREMENTS AND MAKE REVISIONS 2.3
RESULTS FROM INDIVIDUAL TRIALS ACCEPTABLE?
NO
YES
DEVELOP PLAN FOR GROUP TRIALS 2.4
CONDUCT GROUP TRIALS 2.5
DETERMINE REVISION REQUIREMENTS AND MAKE REVISIONS 2.6
RESULTS FROM GROUP TRIALS ACCEPTABLE?
NO
YES
BLOCK IV.1

FIGURE III.21: Flowchart of Block III.5: VALIDATE INSTRUCTION

REFERENCES

REFERENCES

PHASE III

Block III.1

Aagard, J. A., & Braby, R. Learning guidelines and algorithms for twelve types of training objectives (TAEG Report No. 23). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, in press.

Learning algorithms have been developed for fundamentally different types of training objectives representing military tasks. They are based, in part, on an earlier Navy study on common Navy tasks and are designed so that (1) a wide range of tasks can be grouped into a small number of categories, (2) all the training objectives in one category can be achieved by using a single learning algorithm, and (3) each category of training objectives requires a different learning algorithm; i.e., fundamentally different from the training strategies required by other classes of training objectives.

Braby, R., Henry, J. M., Parrish, W. F., Jr., & Swope, W. M. A technique for choosing cost-effective instructional delivery systems (TAEG Report No. 16). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, April 1975.

The process of selecting instructional delivery systems is formally initiated when the training objectives for a proposed training system have been received. A set of training objectives are an input to the TECEP, a process for selecting cost-efficient instructional delivery systems. Starting with this set of objectives a sequence of steps is accomplished for deriving appropriate learning strategies, identifying instructional delivery systems capable of supporting these strategies, and determining costs associated with these delivery systems. The output of this effort is a description of an optimum instructional delivery system for accomplishing the training objectives.

Carroll, J. A model of school learning. Teachers College Record, 1963, 64, 723-733.

This conceptual model suggests, at a superordinate level, every element required for an individual's success or failure. The article presents factors which are conceived as being determinants of the times needed or actually spent in learning a task and the way in which these factors interact to result in various degrees of successful learning.

Homme, L., Csanyi, A. P., Gonzales, M. A., & Rechs, J. R. How to use contingency contracting in the classroom. Champaign, Ill.: Research Press, 1971.

The authors of this book present contingency contracting as one approach to the use of reinforcement principles to motivate better learning. The procedures outlined in this book are based on arranging the conditions so that the learner gets to do something he wants to do following something the instructor wants him to do.

Klaus, D. J. Students as teaching resources: A survey of teaching models using non-professionals (peer tutoring) (AIR 40900-10/73-FR). Pittsburgh, Pa.: American Institutes for Research, October 1973.

This preliminary survey was designed to explore the possible use of students as teaching resources in the developing countries. A substantial number of reports and descriptions of projects already conducted in the United States, and a few carried out overseas, suggest that students represent a significantly under-utilized resource and yet could be mobilized to help other children learn. Four general models of peer tutoring are described. A research design, emphasizing effective instruction in over-crowded classrooms, was reported as part of a five-year schedule for innovative programs in developing countries.

Weingarten, K., Hungerland, J. E., & Brennan, M. F. Development and implementation of a quality-assured, peer-instructional model (HumRRO) Technical Report 72-35). Alexandria, Va.: Human Resources Research Organization, November 1972.

This model describes a quality-assured, peer-instructional system incorporating six principles essential to effective instruction, and accomodating practical constraints having to do with cost and the ease of implementation. Data was collected comparing the conventional and APSTRAT systems in the course of the pilot study at Ft. Ord. From this pilot study, the data indicated that the primary objectives of the program were attained--substantial gain in proficiency for men of all aptitudes, and reduction of academic attrition and recycles.

REFERENCES

PHASE III

Block III.2

Braby, R., Henry, J. M., Parrish, W. F., Jr., & Swope, W. M. A technique for choosing cost-effective instructional delivery systems (TAEG Report No. 16). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, April 1975.

The purpose of this report is to make available to training specialists a procedure for choosing instructional delivery systems appropriate to various types of military training. The TECEP technique serves as a performance aid for the training specialist to use in defining appropriate training strategies for training objectives, choosing instructional delivery systems capable of carrying out the training stretegies, and identifying the relative cost of these alternatives. Through the use of this procedure, training specialists choose the cost-effective instructional delivery system over its competitors.

REFERENCES

PHASE III

Block III.3

Deterline, W. A., & Lenn, P. D. Coordinated instructional systems training: A self-study course for teachers. Palo Alto, Calif.: Sound Education, Inc., 1972.

The development of instructional materials requires large expenditures of time, financial and human resources. The CISTRAIN model presents a framework for designing new materials following a systematic approach to instructional systems design. This model can also be applied to the analysis of existing materials to determine their suitability in meeting course objectives.

Todd, R. D., & Hawthorne, R. D. Modification of curriculum materials: An alternative with considerable potential. American Vocational Journal, October 1973, 42-44.

One of the very few documents available on the topic of materials modification, this article presents an eight-step model for determining the nature and scope of needed modification.

REFERENCES

PHASE III

Block III.4

Briggs, L. J. Handbook of procedures for the design of instruction. Pittsburgh, Pa.: American Institutes for Research, 1970. (Monograph No. 4)

This monograph presents a set of procedures for the design of instruction. The instructional design process described consists of three major stages: design, development, and evaluation. Useful as a guide for planning and developing instructional materials, the material is organized by assignments and by steps, and can be considered self-instructional.

Dale, Edgar. Audiovisual methods in teaching. Hinsfale, Ill.: The Dryden Press, 1969.

Audiovisual materials compose an integral part of any training program. A systematic approach to instruction views the use of audiovisual materials as a complement rather than a supplement to instruction. Novel applications of audiovisual techniques to the design of instruction are presented in detail.

Department of the Air Force. Handbook for designers of instructional systems: Planning, developing, and validating instruction (Vol. IV, AFP 50-58). Washington, D.C.: Headquarters, United States Air Force, July 1973.

This fourth-volume pamphlet provides guidance in applying the ISD process described in AFM 50-2. The pamphlet is for the use of education and training personnel who plan, develop, approve, administer, or manage Air Force instruction and supporting materials. Volume IV,"Planning, Developing, and Validating Instruction," provides guidance on how to make media selection and resource requirement decisions, develop instructional materials, validate the materials developed, and implement the system.

Department of the Navy. *Procedures for the planning, design, development, and management of Navy technical training courses* (CNTT-A10). Millington, Tenn.: Naval Technical Training Command, Naval Air Station, Memphis, September 1974.

Although this document is a comprehensive approach to the design of technical training course, the sections on course design and development are particularly helpful. The procedures for developing criterion tests, selecting instructional strategies, sequencing learning objectives, producing the curriculum outline and instructional strategies, and validation are discussed.

Deterline Associates. *Developing instructor-free instruction* (Task VI.B Report, Contract No. N61339-73-C-0150). Palo Alto, Calif.: Deterline Associates, 1975.

This report details information on how to convert existing instruction to correspondence courses, how to prepare STEPs, and how to convert mediated materials to print materials.

Deterline, W. A., & Lenn, P. D. *Coordinated instructional systems training: A self-study course for teachers*. Palo Alto, Calif.: Sound Education, Inc., 1972.

This course is about the design of instruction, emphasizing procedures for making instruction as effective as possible and including procedures for individualizing instruction. The purpose of the course is to help you learn a set of skills and techniques that will serve you as you design, develop, and implement instruction for your students. It works as a self-study course, individualized and with specified learning outcomes. This is not a "read about" course; it is a "workshop" or "laboratory" type of course, involving actual design and development of lessons and testing the lessons with "real live" students, not just to find out how well students learn, but to find how well the lessons teach.

Espich, J. E., & Willians, B. *Developing programmed instructional materials*. Belmont, California: Fearon Publishers, 1967.

Many individualized learning programs employ programmed instruction in some fashion, to deliver all or part of the instruction. This brief book contains an explanation and practice frames on the preparation, construction, and testing of programmed instruction sequences.

Frieson, Paul A. *Designing instruction*. Santa Monica, Calif.: Miller Publishing Co., 1973.

Instructional technology offers a systematic and logical means for the design of instruction. Programmed instruction, for example, is very heavily based in the concepts, techniques, and principles of instructional technology. This manual describes a systems method of instructional designed material based on an application of programmed instruction.

Joyce, R. P., Chenzoff, A. P., Mulligan, J. L., & Mallory, W. J. *Fully proceduralized job performance aids: Handbook for JPA developers*. Brooks Air Force Base, Texas: Air Force Systems Command, Human Resources Laboratory, December 1975.

Since relatively few fully proceduralized JPAs have been developed, few people have been trained in the technology. This handbook describes a method to increase this capacity and to provide Air Force personnel with the knowledge necessary to effectively monitor JPA procurement. Also, the need for coordination between JPA content and job-oriented training content is discussed. It is increasingly realized that such coordination can provide superior on-job performance, and can be more cost-effective.

Mager, R. F., & Pipe, P. *Analyzing performance problems*. Belmont, Calif.: Fearon Publishers, December 1975.

Some performance problems can be easily solved, especially those relating to simple skill deficiencies. Other problems can be eliminated by applying principles of human behavior. This book is about problems that arise when a job is not being done properly and explains a procedure for analyzing such problems.

The Ministry of Defense, Her Majesty's Royal Navy (Producer). Programmed instruction. London: Stewart Films, Ltd., 1970. (Film)

This film describes the underlying concepts of programmed instruction. It serves as a very effective introduction to these concepts, especially in describing behavioral objectives.

Zettl, H. Televised production handbook. Belmont, California: Wadsworth Publishing Co., 1968.

Before television programs can be produced to communicate an instructional message it is necessary to become familiar with the technology of the medium. This text achieves just this purpose through a concise description of the technical equipment, performance, and production aspects of television technology.

REFERENCES

PHASE III

Block III.5

Deterline, W. A., & Lenn, P. D. Coordinated instructional systems training: A self-study course for teachers. Palo Alto, Calif.: Sound Education, Inc., 1972.

The formative evaluation or process of validating instruction is a key component of a coordinated instructional system. The CISTRAIN model, based on systematic course development, requires the instructional designer to validate all instruction to ensure that the learning objectives are realized.

Mager, R. L. Measuring instructional intent. Palo Alto, California: Fearon Publishers, 1974.

In order to find out if the developed instruction is successful, validation of instructional materials is necessary to determine if one has succeeded as intended. According to Mager, the measurement of this success is accomplished through the development of situations or test items which reflect the carefully written objective. This book presents information on how to develop basic tools with which to measure instructional intent and how to recognize items which can determine whether a student has achieved the instructional objective.

Popham, W. J. Evaluating instruction. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1973.

Renewed interest in evaluating classroom instruction is evident at all levels of educational endeavor. This self-instructional book provides the reader with a basic working knowledge of measurement, test theory, and evaluation.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associated, 1974.

The validation process (formative evaluation) tries out instruction on a small sample of target population for the purpose of ascertaining if the instruction meets the learning objectives. When properly followed, the validation process insures better, quality instruction. Specifically, this means that all trainees will achieve the objectives after instruction.

GLOSSARY

ACRONYMS

AFS - Air Force Speciality

AR - Army Regulations

CMI - Computer Managed Instruction

CRT - Criterion Referenced Test

CODAP - Comprehensive Occupational Data Analysis Programs

DOS - Defense Occupational Specialities

FM - Field Manuals

FOJT - Formal On The Job Training

GED - General Educational Development

HQ - Headquarters

ISD - Instructional Systems Development

ISS - Installation Support School

ITV - Instructional Television

JPA - Job Performance Aids

JPM - Job Performance Measure

KOR - Knowledge of Results

LO - Learning Objective

LS - Learning Step

MODB - Military Occupational Data Bank

MOS - Military Occupational Specialities (Army/Marine Corps)

MWO - Modification Work Orders

NIH - Not Invented Here

NOTAP - Naval Occupational Task Analysis Program

OJT - On The Job Training

OSR - Occupational Survey Report

POI - Program of Instruction

QQPRI - Qualitative and Quantitative Personnel Requirements Identification

RS - Resident School

SME - Subject Matter Expert

SMP - System Master Plan

SOP - Standing Operation Procedures, Standard Operating Procedures

STEP - Self-Teaching Exportable Package

TAK - Trainer Appraisal Kit

TI - Traditional Instruction

GLOSSARY

ABILITY GROUPING: Arrangement whereby students are assigned to groups on the basis of aptitude testing.

ABSOLUTE STANDARDS: A statement defining the exact level of performance required of a student as a demonstration that he has mastered the course objective(s). Criterion-referenced tests are usually based on an absolute standard.

ACHIEVEMENT GROUPING: Arrangement whereby students are assigned to groups according to their performance on pretests of units of the course.

ACTION: Occurs in terminal learning objectives and learning objectives; describes the specific behavior the learner is to exhibit after training.

ACTION VERBS: Verbs that convey action and reflect the type of learning that is to occur. Action verbs must reflect behaviors that are measureable, observable, verifiable, and reliable.

ACTIVITY STEP: One simple operation or movement that comprises part of a job. A job performance standard consists of a list of these operations or movements.

ADJUNCT PROGRAMMING: A method of combining the features of good existing instructional materials (e.g., films, textbooks) with special directions or questions to guide the learner.

ADMINISTRATIVE CRITERIA: In media selection, the options that courseware be developed locally or at some central location.

ALGORITHM: A rule or procedure for accomplishing a task or solving a problem.

ALPHANUMERIC: Refers to a combination of letters and numbers; for example, on the keyboard of a teletype.

ALTERNATE PATH: Refers to elements which have relationships in which the specific situation encountered determines the appropriate sequence, or it may be another way of meeting the same objective.

TLO - Terminal Learning Objective

TM - Technical Manuals

TOE - Tables of Organization and Equipment

TRADOC - U.S. Training and Doctrine Command

BLOCKING: Refers to the process of defining and illustrating the different camera movements and camera shots in a television or film script. A blocked script may also contain directions as to the movement of actors as well as scenery changes.

CHECKLIST: Job performance aid which lists the elements of a task in the sequence of execution. The job holder places a check beside each element as it is accomplished, thus insuring that the task is completed.

CHRONOLOGICAL ORDER: Arranging content in order from one topic to another based on when they occurred in time.

COMMON-FACTOR LEARNING OBJECTIVES: Refers to learning objectives that are identical, or that have identical action words and similar objects of the action in the learning objective statement.

COMPARATIVE SEQUENCE: Sequencing which starts with familiar topics and goes to unfamiliar ones.

COMPLEXITY CRITERION: In media selection, the degree of complexity required of instructional materials in order to adequately train students to meet learning objectives.

COMPUTER MODELS TECHNIQUE: Occurs during the simulation of an operational system; involves having a computer simulate the major operations of the system, under a variety of conditions.

CONDITIONS: Occurs in terminal learning objectives; describes what is presented to the student in order to accomplish the specified action, that is, it describes the important aspects of the performance environment.

CONTIGUITY: Refers, in learning, to the principle that events which occur closely together become associated by the learner.

CONTINGENCY MANAGEMENT: The establishment of a set of procedures by which trainees are required to perform a certain amount of work or to achieve certain objectives before engaging in activities that are preferred by the trainee (e.g., recreation, a break, or a more desirable training event).

ASSESSMENT: A judgment of the effectiveness and efficiency of a training system, in terms of measurement and evaluation.

ASSOCIATION DEVICES: Memory aids, techniques which ease recall. Mnemonic devices.

ATTITUDE: A persisting state of a person that influences his choice of action.

ATTITUDE MEASURE: An instrument designed to gather information about how people feel toward a particular object. This could include liking or disliking subject matter, usefulness of a medium, or opinions about the medium.

AUDIO-ONLY PROGRAM: A production which does not contain any video or pictures; for example, a record or radio program.

AUDIO PRODUCER: Prepares tape recordings and produces audio programs. The audio producer combines narration, music, and other sound effects in the production of an audio program.

AUDIOVISUAL MEDIA: Refers to any device such as television or film which is both seen and heard.

BASELINE DATA: Valid and reliable information about the current level of performance of the intended student population. This data can be used to confirm the need to develop new instruction, or can be used as a comparison in ascertaining differences between students' performance before and after instruction.

BEHAVIORAL ATTRIBUTES: Qualities or activities that characterize an object or process. Behavioral attributes characterize each category of learning.

BLOCK SCHEDULING: Mode of instruction whereby all students receive the same instruction at the same time.

DECISION TREE: Flowchart; graphic representation of the sequence of a specific activity or operation.

DELIVERY SYSTEM: Any method containing plans and procedures for the presentation of instruction. Platform instruction, television, FOJT, and STEPs are all delivery systems.

DEPENDENT RELATIONSHIP: Occurs when skills and knowledges in one learning objective are closely related to those in the other learning objective. In order to master one of the learning objectives, it is first necessary to learn the other.

DOWNTIME: Refers to the period of time when equipment is inoperable.

DUTY: One of the major subdivisions of work performed by one individual. One or more duties constitute a job.

DUTY TITLE: Categorizes groups of tasks under identifiable headings to help in the organizing of lists of tasks.

EMPIRICALLY BASED REVISION: Revision based on the results of test data and the collection of other types of quantitative information.

ENTRY BEHAVIOR: The skill, knowledge, and/or attitude required before beginning a new segment of instruction; also may refer to the capability a person has prior to new learning.

ENTRY SKILLS: Specific, measurable behaviors that have been determined through the process of analysis of learning requirements to be basic to subsequent knowledge or skill in the course.

ENTRY SKILLS TEST: A measurement instrument designed to determine if a student already possesses certain skills or knowledge needed as a prerequisite before undertaking new instruction.

ENTRY TEST: Contains items based on the objectives that the intended students must have mastered in order to begin the course.

COURSE DOCUMENTATION: Information describing the current content of a course (instructional materials, tests, instructor's manual, evaluation plan, student's manual) and its developmental history (job analysis, criteria for selecting tasks for training, previous revisions).

CLUSTERING: A process of organizing many tasks into groups for the purpose of deciding upon the optimal instructional setting mix for that group of tasks.

CRITERION-REFERENCED TEST: Measures what an individual can do or knows, compared to what he must be able to do or must know in order to successfully perform a task. Here an individual's performance is compared to external criteria or performance standards which are derived from an analysis of what is required to do a particular task.

CRITICAL CUE: Cue which must be correctly interpreted by the student before we can correctly perform the associated task.

CRITICAL SEQUENCE: Sequencing of topics or objectives according to their importance.

CUE: A word or other signal that initiates or guides behavior; a prompt.

CUT-OFF SCORE: Minimum passing score.

DATA: Collection of facts or numerical values resulting from observations of situations, objects, or people.

DATA COLLECTION PLAN: An outline of the procedures and techniques that will be used to gather information for any specific purpose.

DATA RECORDING PLAN: Method of tabulating background responses and test data.

DECAY RATE: The amount of time it takes a trainee to forget what he has learned in school. If the decay rate is high then a trainee should not receive instruction in a specific task until shortly before he will actually perform it.

FOJT--FORMAL ON-THE-JOB TRAINING: This type of training takes place in the actual work situation.

FOLLOW-UP ACTIVITIES: The work events that occur after a course of instruction has been completed.

FORMATIVE EVALUATION: The iterative process of developing and improving instructional materials and procedures.

FIDELITY: Refers to how well the actions, conditions, cues, and standards of the JPM approximate those of the task.

FIELD USER NEEDS: The general and specific duties that will have to be taught to the trainee if he is to be able to adequately perform in a real world environment.

FIRST DRAFT MATERIALS: Any materials (book, film, etc.) which are not yet committed to their final form. First draft refers to the fact that the materials are still in 'rough' form and will be revised on the basis of test results and other data.

FLOWCHART: A graphic representation of the sequence of a specific activity or operation; decision tree.

FRONT END ANALYSIS: Refers to job analysis, selection of tasks for training, and development of JPMs.

FIXED SEQUENCE: Refers to elements that are always done in the same order.

GRAPHIC ARTIST: Designs and prepares a wide variety of visual illustrations such as graphs, charts, and diagrams.

GRAPHIC SCALE: Measurement device which includes some type of number line on which students indicate their attitude toward a social object.

GO NO-GO: Pass-fail; criterion of evaluation whereby student cannot be "partially correct". He is either 100% correct (go) or incorrect (no-go).

ERROR OF HALO: Occurs when an observer sometimes allows his rating of performance to be influenced by his general impression of a person.

ERRORS OF LOGIC: Occur when two or more traits are being rated. It is present if an observer tends to give similar ratings to traits which do not necessarily go together. The traits are related only in the mind of the person making the error.

ERRORS OF STANDARD: Occur when observers tend to rate performers too high or too low because of differences in their standards.

EVALUATION: The process of interpreting the results of measurement data (e.g., tests, JPMs) for the purpose of making a judgment or decision on the instruction or on the success of a trainee.

EVALUATION CRITERIA: The measures used to determine the adequacy of performance.

EVALUATION PLAN: A method or outline of what set of procedures will be used to gather data and information for the purpose of assessing a course of instruction.

EXTERNAL CUES: Signals for action that exist outside of the student (conditions, features, or characteristics of the job environment that trigger action).

FALSE NEGATIVE: Occurs when a person can perform the task but receives a failing score on the test.

FALSE POSITIVE: Occurs when a person cannot perform the task but receives a passing score on the test.

FEEDBACK: The return of information. Information on student performance is "fed" back to the student so that he can improve that performance; to the instructional designer so that he can improve materials and procedures on the basis of student needs; to the management system so it can monitor the internal and external integrity of the instruction and make appropriate revisions. Or, refers to the flow of data or information from one step in the ISD Model to others.

INSTRUCTIONAL MANAGEMENT PLAN: The specifications for the scheduling, instruction and evaluation of trainees toward the goal of course completion.

INSTRUCTIONAL PROGRAM: The development of various materials (books, audiovisual productions, etc.) designed to achieve a specific training goal.

INSTRUCTIONAL SETTING: The vehicle through which a trainee who initially is not able to perform a task becomes proficient in performing the task; for example, performance aids, self-teaching exportable packages, formal on-job training, installation support schools, and resident schools.

INSTRUCTIONAL SUPPORT: Learning resources; different kinds of material, number of instructors, amount of time, etc. which will contribute to the learning situation.

INSTRUCTIONAL SYSTEM: The total effort, distinct from the operating system by location, authority, or mission, that is concerned with the preparation of individuals to serve the operating system.

INTERNAL CUES: Internal biological signals that initiate or guide behavior.

INTERNAL EVALUATION: Assessment of the effectiveness of an instructional program in terms of student performance on stated terminal learning objectives.

JOB: The duties and tasks performed by a single worker constitute his job. If identical duties and tasks are performed by several individuals, they all hold the same job. The job is the basic unit used in carrying out the personnel actions of selection, training, classification, and assignment.

JOB ANALYSIS: The basic method used to obtain a detailed listings of duites, tasks, and elements necessary to perform a clearly defined, specific job, involving observations of workers and conversations with those who know the job, in order to describe in detail the work involved, including conditions and standards.

GROUP MANAGEMENT PLAN: Arrangement whereby instruction is scheduled and conducted for groups instead of individuals.

GROUP TRAINING: A group of people gathered together for the purpose of receiving information or instruction in the performance of some specific task.

HARD DATA: A direct and precise measure of a specific performance. A JPM is an example of hard data while an attitude questionnaire is a less direct measure, providing soft data.

HIGH DENSITY SIGNAL: A signal containing many cues. A low density signal contains few cues.

INDEPENDENT RELATIONSHIP: Occurs when skills and knowledges in one objective are unrelated to those in the other objective. Mastering one of the objectives does not simplify the other.

INDICATOR BEHAVIOR: Refers to that behavior that indicates the presence of a specific attitude.

INDIVIDUALIZED INSTRUCTION: Refers, in the ISD Model, to a management scheme which permits individual characteristics of trainees to be a major determinant of the kind and amount of instruction given. Here, it nearly always implies some form of self-pacing.

INSTALLATION SUPPORT SCHOOLS: Organized and operated by individual units or commands to meet local training requirements.

INSTRUCTIONAL CONDITIONS: The amount of participation which the instruction requires of the learner. Instructional conditions may be active (the learner produces or practices) or passive (the learner sits and listens).

INSTRUCTIONAL DESIGNER: Person who designs and develops a program or course of studies based on a systematic analysis.

INFORMATION: Knowledge; the facts, names, labels, and larger bodies of knowledge that are necessary for successful job performance.

LEARNING GUIDELINES: Statements which specify the learning events and activities appropriate to specific instruction. Learning guidelines combine to form learning subcategories.

LEARNING HIERARCHY: Graphically portrays the relationships among learning tasks in which some tasks must be mastered before others can be learned.

LEARNING OBJECTIVE: Describes precisely what is to be learned in terms of the expected student performance under specified conditions to accepted standards. These learning objectives identify the mental skills, information, attitudes, or physical skills that are required to perform the terminal learning objective.

LEARNING RESOURCE CENTER: Library containing instructional materials and areas for viewing and study.

LEARNING STEP: Occurs when learning objectives are broken down into smaller parts.

LEARNING SUB-CATEGORY: A division of a learning category.

LEARNING TASK ANALYSIS: Procedure used in the domain of intellectual skills to identify prerequisite tasks that must be learned before a person can learn a given task.

LINK TRAINER: Mechanical training device which simulates the cockpit of an aircraft.

RESPONSE BIAS: Tendency to favor a certain response over others.

MANAGEMENT PLAN: Program for the assignment, monitoring, and assessment of the personnel, materials, and resources dedicated to a specific mission, operation, or function.

MASTERY: In terms of learning, refers to meeting all of the specified minimum requirements for a specific performance. Criteria for mastery are defined in the design phase of the ISD Model.

JOB FIDELITY: The degree to which a testing situation truthfully and accurately reflects the job situation.

JOB PERFORMANCE MEASURES: Tests that are used to evaluate proficiency of a job holder on each task he performs.

JOB PERFORMANCE TEST: Test used to determine whether or how well an individual can perform a job. In may include either all of the job performance measures for a particular job or a subset of the job performance measures.

JPA--JOB PERFORMANCE AID: A checklist, instruction sheet, or other device that offers a possible alternative to training rather than an actual method of training; they are developed to eliminate or minimize training requirements for some tasks.

KNOWLEDGE OF RESULTS: Feedback; information provided to the student indicating the correctness of his response. Evaluative knowledge of results indicates what a student is doing right and what he is doing wrong. Comparative knowledge of results indicates how the student's response compares to the objective or standard established by the instructor.

LEARNER CHARACTERICTICS: The traits possessed by learners that could affect their ability to learn (e.g., age, I.Q., reading level, etc.).

LEARNING ACTIVITY: The specific behaviors a student performs during a particular episode of learning.

LEARNING ANALYSIS: A procedure to identify subelements that must be learned before a person can achieve mastery of the performance.

LEARNING CATEGORY: A division of learning behavior. All learning may be classified into one of four learning categories: mental skill, physical skill, information, or attitude.

LEARNING EVENT: The immediate outcome of a learning activity.

MNEMONICS: Methods which make information easier to remember; memory aids.

MODE OF INSTRUCTION: Method of scheduling materials presentation. The instructional mode may be individualized (self-pacing) or group (block scheduling).

MODULE: An individualized self-instructional package usually containing all the necessary materials a learner needs to meet some or part of a terminal learning objective.

MULTIMEDIA PACKAGE: Self-contained instructional unit in more than one medium.

NARRATION: Is the voice overheard on an audiovisual program.

NARRATOR: Is the person whose voice is heard describing or commenting upon the content of a film, television program, etc.

NUMERICAL SCALE: Measurement device which associates verbal descriptions of social objects with numbers and requires students to indicate their attitudes by marking the appropriate number.

OBSERVATION INTERVIEW: Job holder is observed in the job environment performing all or a substantial part of the job; the job holder performs the job while the analyst ask questions.

OFF-LINE: Refers to any activity which does not take place as part of the regular production process.

OVERLEARNING: Refers to the continual practice on a learning task by a person who has correctly performed the task.

PEER TUTORING: A form of instruction in which students at the same or more advanced level of knowledge provide instruction to students at the same or lower level of knowledge on the specific objectives under consideration. Peer tutors are not members of the existing instructional establishment.

MEAN: Arithmetic average calculated by adding up all scores and dividing by the number of scores.

MEASUREMENT: Consists of rules for assigning numbers to objects to represent quantities of attributes.

MEASUREMENT ERRORS: Incorrect procedures carried out during the measurement process which invalidate the results. These errors result from unfounded assumtions made by judges or raters.

MEASUREMENT PROCESS: The operations involved in determining the amount of an attribute (e.g., skill, knowledge, or attitude) possessed by a student.

MEDIA: Means for presenting instructional material to learners; for example, books, audiotapes, and filmstrips.

MEDIA ALTERNATIVE: A form of instructional material that contains the stimulus criteria required by a specific learning activity.

MEDIA MIX: Combination of different media used to present a unit of instruction.

MEDIA POOL: All of the media options suitable for a given unit of instruction. The final media choice is drawn from the media pool.

MEDIA SELECTION: Is the major means of determining how instruction is to be packaged and presented to the student.

MENTAL SET: A preparatory mental adjustment, or readiness, for a particular type of experience.

MENTAL SKILLS: Those processes of identifying, classifying, using rules, and solving problems that involve active mental processing. Mental skills imply the capability of applying the learning to some situation and demonstrating the mental skill, such as thinking, creating, and analyzing.

PROCESS STANDARDS: Refers to the conditions which must be satisfied for a job to be successfully completed. Process standards refer to sequence, accuracy, speed of performance, and completeness.

PROGRAMMED INSTRUCTION: Instructional materials which present subject matter in a series of small sequential units which require responses from the student.

PROMPT: A word or other signal that initiates or guides behavior; a cue.

QUALITY CONTROL: Process of measuring and evaluating in order to maintain course standards through adjustments in instructional materials or procedures.

QUALITY CONTROL DATA: Information which reflects the degree of success achieved by a system or operation.

RANDOM SELECTION: Choosing people or objects at random rather than according to some systematic plan.

RANK ORDER: The assignment of ranks to students. This could refer to groups, such as the top 10%, or simply listing each student from highest to lowest. Rank ordering is appropriate when there is a need to select the fastest, the most accurate, or the best producer.

RATING ERRORS: Errors of standards, ratio, and logic.

RATING SCALE: A measurement device in which a student must choose a response from a range of choices arranged in a continuum from low to high or good to bad, etc.

REGULATIONS: Rules for appropriate conduct and behavior.

RELIABILITY: The consistency with which a test measures the amount of student achievement.

RESIDENT SCHOOLS: These schools are designed to meet service-wide training requirements.

PERFORMANCE EVALUATION: The gathering of data to specifically determine the success of students on a specific task, as a result of a training program.

PERFORMANCE MEASURES: The absolute standard by which a job performance is judged. A performance measure is the inventory of job tasks with each performance objective.

PERSEVERATE: Continue an activity until it is completed, regardless of the difficulty, or the appropriateness of the solution technique to the problem.

PERT--PROGRAM EVALUATION REVIEW TECHNIQUE: PERT is a method of monitoring the flow of a large project by breaking it down into small individual activities and assigning each activity a specified amount of time for completion.

PHYSICAL SKILLS: Specified muscular activities for accomplishing a goal.

POST FEEDBACK DELAY: The pause which follows the presentation of feedback. This allows time for the correct response to "sink in."

POSTTEST: A test administered after the completion of instruction to assess whether a student has mastered the objectives of the course or unit.

PREDICTIVE VALIDITY: The ability of a test score to accurately forecast future performance.

PREDIFFERENTIATION OF STIMULI: Pointing out the distinguishing features of an object and explaining the differences between them.

PRETEST: Administered prior to instruction to determine how much the student already knows.

PROCESS EVALUATION: An early stage in ISD development that identifies which steps in the model will be used for the course under development. The purpose of the process evaluation is to describe and document the actual developmental process for this particular instruction.

SIMULATION: Any change from reality or any imitation of reality. Three types are common: simulating part of the system, simulating the operation of the system, and simulating the environment in which the system will operate.

SIMULATORS: Machines or processes designed to provide training which will have high positive transfer to the real world equipment or situation. Simulators are ordinarily cheaper, safer, or more available than the actual situation or equipment.

SLIDE-TAPE: A combination of visual slides and an audio tape synchronized so that the audio describes the content of the slides.

SOFT DATA: Obtained from attitude or opinion surveys. This data is not as reliable as hard data.

STANDARDS: Occurs in terminal learning objectives or learning objectives; describes the criterion or standard of performance which must be attained.

STIMULUS CRITERIA: Those basic qualities or capabilities of a medium that are required to carry out the intent of the learning activity; for example, visual images, motion, color, and sound.

STORYBOARD: A collection or series of small pictures which describe the action and content that will be contained in an audiovisual or visual-only production. A sequence of these small pictures comprise a storyboard.

SUBJECT MATTER EXPERT: A person who has professional skill in the performance of some job and who is consulted by an instructional designer in the process of job task analysis.

SUPPORTIVE RELATIONSHIP: Occurs when skills and knowledges in one objective have some relationship to those in the other objective; the learning involved in mastery of one learning objective transfers to the other, making learning involved in the mastery of the other easier.

REVISION PLAN: A detailed outline of the procedures to be taken to modify the structure or content of a course.

REWARD SEQUENCE: Scheduling the more pleasant activity to follow the less pleasant activity; can be used to provide a reward for completion.

SAMPLE: A portion or small segment of the students for whom instruction is designed.

SAMPLING PLAN. Procedure for selecting a small but representative group from a larger population.

SCALE: In media selection, some materials must represent actual objects and accurately represent the dimensions of those objects. A model may, for example, be full scale, half scale, or on a 1 to 10 scale with the actual object.

SELF PACING: Mode of instruction whereby each student works through the instructional materials at his own rate of speed.

SELF-PACED MANAGEMENT PLAN: Arrangement whereby instruction is scheduled and conducted for individual students rather than groups of students.

SELF-TEACHING EXPORTABLE PACKAGES: Self-instructional study units; generally sent to the student wherever he is stationed.

SEQUENCING: Ordering instruction; proper sequencing allows the learner to make the transition from one skill or body of knowledge to another, and assures that supporting skills and knowledge are acquired before dependent performances are introduced.

SHAPING: Gradually changing a student's behavior until it is correct.

SIGNAL: Cue that initiates and directs activity.

SIMULATION: Any change from reality or any imitation of reality. Three types are common: simulating part of the system, simulating the operation of the system, and simulating the environment in which the system will operate.

SIMULATORS: Machines or processes designed to provide training which will have high positive transfer to the real world equipment or situation. Simulators are ordinarily cheaper, safer, or more available than the actual situation or equipment.

SLIDE-TAPE: A combination of visual slides and an audio tape synchronized so that the audio describes the content of the slides.

SOFT DATA: Obtained from attitude or opinion surveys. This data is not as reliable as hard data.

STANDARDS: Occurs in terminal learning objectives or learning objectives; describes the criterion or standard of performance which must be attained.

STIMULUS CRITERIA: Those basic qualities or capabilities of a medium that are required to carry out the intent of the learning activity; for example, visual images, motion, color, and sound.

STORYBOARD: A collection or series of small pictures which describe the action and content that will be contained in an audiovisual or visual-only production. A sequence of these small pictures comprise a storyboard.

SUBJECT MATTER EXPERT: A person who has professional skill in the performance of some job and who is consulted by an instructional designer in the process of job task analysis.

SUPPORTIVE RELATIONSHIP: Occurs when skills and knowledges in one objective have some relationship to those in the other objective; the learning involved in mastery of one learning objective transfers to the other, making learning involved in the mastery of the other easier.

TASK STATEMENT: A statement of highly specific action which has a verb and object; for example, sort mail.

TECHNICAL ORDERS: Military regulations which deal with the specific nature of technical materials and equipment.

TERMINAL LEARNING OBJECTIVE: Derived from job performance measures, TLOs are to be attained during training. TLOs are broken down into their component parts which are documented as learning objectives which may be further divided into learning steps. Each TLO contains actions, conditions, and standards.

TESTS: Any device or technique used to measure the performance of a student on a specific task or subject matter.

TESTING CONSTRAINTS: Limitations such as time, money, personnel, facilities, and other resources, which prohibit job performance measures from being identical to the tasks they measure.

TRADE-OFFS: In any systematic approach to instruction, it is necessary to make compromises between what is desirable and what is possible. Ordinarily, these decisions involve increases or decreases in time, money, facilities, equipment, or personnel. Training aids and simulators represent examples of trade-offs.

TRAINER APPRAISAL KIT: A package of instructional materials designed to provide a course instructor with practice in the preparation, presentation, and validation of instruction.

TRAINING: The teaching of job skills. It can take a number of forms such as self-teaching exportable packages, training manuals, individual learning packages, FOJT, or group training.

TRAINING SETTING CRITERIA: In media selection, the options that training must be either small group, large group, individualized at a fixed location, or individualized independent of location.

SYMBOL: Anything that stands for or represents something else. A plus sign (+) is a symbol for the mathematical operation of addition.

SYSTEM MASTER PLAN: Control document used to coordinate the development and implementation of an instructional program.

SYNCHRONIZING PULSE: An audible or inaudible sound used to coordinate the audio and video portions of a slide-tape program so that audio and video (i.e., slide and narration) are coordinated.

SYSTEMS APPROACH: A generic term referring to the orderly process of analysis, design, development, evaluation, revision, and operation of a collection of interrelated elements.

TALK-THROUGH TECHNIQUE: Occurs during the simulation of an operational system; involves talking through each operation in the new system to determine decisions and contingencies.

TARGET POPULATION: The pool of potential entrants to training for which instructional materials are designed and tried out.

TASK DELAY TOLERANCE: A measure of how much delay can be tolerated between the time the need for task performance becomes evident and the time actual performance must begin.

TASK: Formed in clusters which make up duties. A task is the lowest level of behavior in a job that describes the performance of a meaningful function in the job under consideration.

TASK INVENTORY: List that itemizes all of the tasks that make up a selected duty.

TASK LEARNING DIFFICULTY: Refers to time, effort, and assistance required by a student to achieve performance proficiency.

TASK STANDARD: A statement of how well a task must be performed.

TRYOUT: Practice test; the purpose is to make the tryout as realistic as possible by eliminating as many sources of unreliability as possible.

UNDERTRAIN: Provide inadequate training that does not prepare a student to meet regular job performance requirements.

VALIDATION: A process through which a course is revised until it is effective in realizing its instructional goal.

VALIDATION DOCUMENTATION: A report which describes in detail how a specific course of instruction was validated and for what target population.

VALIDATION PROCESS: Testing instructional materials on a sample of the target population to insure that the materials are effective.

VALIDITY: The degree to which a test measures what it claims to measure.

VALUE ENGINEERING: Refers to the process of designing equipment or instruction to meet but not exceed the required outcomes. Ordinarily, it refers to the elimination of features or instructional objectives that have not been demonstrated to be positively necessary.

VIGILANCE LEVEL: General degree of watchfulness or attentiveness to what may come.

VISUAL FORM: In media selection, refers to whether alphanumeric or pictorial characteristics are required in a learning situation.

VISUAL SPECTRUM: The type of color required of instructional materials. Some must be with full color, others may be with black and white or shades of grey.

WITHIN-COURSE TESTS: Administered during a course of instruction to assure that all students are "keeping up" with the learning objectives.

WORK ELEMENTS: The element is the smallest component in the structure of a job. Elements combine to form a task, tasks combine to form a duty, and duties combine to form a job.